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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

This report describes how to use the Robotics Investment Decision Model (RIDM). RIDM is a computerized model for assessing the economic attractiveness of investments in robotics and/or flexible manufacturing systems. It is written as a template for Lotus 1-2-3, a popular microcomputer-based electronic spreadsheet program. RIDM models the nominal and discounted cash flows generated by the investment as compared to the existing method of manufacture, and provides the internal rate of return and net present value of the investment, both before and after taxes.

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EXECUTIVE SUMMARY

This report is the product of Phase II research for a three phase project entitled "Investment Justification of Robotic Technology in Aerospace Manufacturing". The project objective is to develop a uniform, accurate, and supportable economic analysis methodology for robotics investment justification for use by the aerospace industry.

In Phase I (AD-A140782), Applied Concepts Corporation (ACC) surveyed robotics investment decision making methodologies used or proposed by government, industry and academia. The research concluded that the Tech Mod/IMIP computerized discounted cash flow model provided the best opportunity for modifying an existing method to perform economic analyses of robotics investment projects.

In Phase II, ACC first attempted to modify the Tech Mod/IMIP model, but found it to be tailored to its specific objective that is, the assessment of Tech Mod/IMIP programs, to a greater extent than previously thought. ACC next developed a new model incorporating as many features of the Tech Mod/IMIP model as was practical. This model is called the Robotics Investment Decision Model or RIDM and can be used industry-wide for assessing the economic attractiveness of investments in robotics.

In Phase III, ACC will validate the model testing it for accuracy, adequacy, and ease of use.

BRMC-83-5080-II

PHASE II - ROBOTICS INVESTMENT DECISION MODEL (RIDM) USERS MANUAL

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Prepared for
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TABLE OF CONTENTS

I. INTRODUCTION

1. The robotics investment decision model (RIDM) is a tool designed for assessing the economic attractiveness of investments in robotics and/or flexible manufacturing systems (FMS). It models the cash flows generated by such an investment, as compared to the existing method of manufacture. Required inputs are the costs under both the robotic/FMS approach and the old method. Additional inputs are required if the user exercises the option in the model to consider changes in work station throughput and/or differences in value added at the work station. Model outputs are nominal cash flow, discounted cash flow, internal rate of return, and net present value of the investment at the user-specified discount rate. Before-tax and after-tax analyses are provided by the model.

2. The model is written as a template for Lotus 1-2-3, one of the popular "electronic spreadsheet" programs. The model was developed on the Zenith Z-100 version of Lotus 1-2-3, Release 1A, running under Z-DOS/MS-DOS release 1.01, version 1.25. To use the model as written, you will need a personal computer which can run Lotus 1-2-3, a disk drive that can read the data diskette on which the model has been installed, and 256 kilobytes of random access memory (RAM). Users with less than 256K RAM can still run the model, but will need to break it into smaller files. The recommended place for the inital break is just before the after-tax analysis section. The model provides for up to a fifteen year analysis period. Users who do not require the entire fifteen year period may eliminate the unnecessary years, thereby reducing memory requirements. A number of additional years may be added to the analysis period without requiring more than 256K RAM.

3. Most IBM PC and IBM-compatible personal computers will be able to run Lotus 1-2-3 and read the RIDM data diskette on which the model is stored. The exact software and memory requirements for using the model will depend upon the versions of Lotus 1-2-3 and DOS that your system uses. Newer versions of DOS (Version 2.0) and Lotus (Release 1A) have more features and require more memory than earlier versions. The preferred RAM availability would remain 256K.

4. Use of the model requires the user to have no more than an intermediate level working knowledge of Lotus 1-2-3. The model's structure and commands have been kept as simple as possible, to facilitate the broadest use throughout industry and to enable the user to modify the model as required to reflect special circumstances of a company or robotic/FMS application. The model contains no Macros or range names, and all cell references are relative.

5. It is important to remember that RIDM assesses the inherent economic attractiveness of robotic/FMS implementation. The model is based upon real economic events, and not upon how those events are accounted for. Thus, for example, the cost of robot hardware is considered to be its purchase price (plus shipping, set up, etc.), plus the interest expense for any funds borrowed to make the purchase. An account-based approach would treat the depreciation expense as the cost. RIDM models the true economic return, both before and after taxes. It does not directly model the impact upon company financial statements, as would an account-based approach. However, RIDM contains all the information necessary for the user to

perform a special "balance sheet" analysis which would show such impacts.

6. RIDM does not address the multitude of special considerations imposed when doing business with the Federal government under cost-based contracts. Primary among these are the impacts of government cost accounting standards (CAS) upon cash flows, and the impact of cost changes upon prices. The Tech Mod/IMIP Model, recently developed by Logistics Management Institute (and sometimes called the LMI Discounted Cash Flow Model), directly addresses these considerations.

II. PROGRAM DESCRIPTION

1. This section presents a short description of the Robotics Investment Decision Model. Step-by-step instructions on how to operate the model are presented in the next section.

2. The program software is written as a Lotus 1-2-3 spreadsheet, with 335 rows and sixteen columns. A basic working knowledge of Lotus 1-2-3 is prerequisite for using the model. All cell references are relative. The model provides a fifteen year analysis period, although it can be modified to allow a shorter or longer period. The first part of the model performs a before-tax analysis, followed by a second part which performs an after-tax analysis. The structure of the model is summarized below:

a. Before Tax Analysis

   1) Old Method Cost Elements

   2) New Method Cost Elements

   3) Cash Flow from Investment

   4) Production Quantity Adjustment

   5) Adjustment for Changes in Quality or Value Added

b. After Tax Analysis

   1) Computation of Depreciation, Investment Tax Credits, and Tax Savings for Old Method

   2) Computation of Depreciation, Investment Tax Credits, and Tax Savings for New Method

   3) Summary of After Tax Analysis

3. Each section is described below in more detail.

a. Before Tax Analysis

(1) Old Method Cost Elements

This section is for user inputs on the costs of the existing or baseline manufacturing method. The inputs should be in the form of nominal dollars.

(2) New Method Cost Elements

This section is for user inputs on the costs of the new or alternative manufacturing method, that is, the robotic or FMS technology. The inputs should be in the form of nominal dollars.

(3) Cash Flow from Investment

This section is computed by the model. The net cash flow from moving from the old method to the new method is presented for each cost element. The overall net cash flow for each year is also presented.

(4) Production Quantity Adjustment

This section is optional. It adjusts the cash flow estimates to reflect the differences in throughput (output) between the old and new method. The throughput effect's impact on cash flow is computed by considering the cost per unit of production under each method, and determining how much more or less it would cost under the old method to produce the same amount as under the new method.

(5) Adjustment for Changes in Quality or Value Added

This section is optional. It adjusts the cash flows for the difference in value added at the work station per unit of output.

After this section, the model presents a summary of the before-tax analysis. The adjusted annual cash flow, cumulative cash flow, internal rate of

return, and net present value of the investment are computed and displayed. Annual and cumulative discounted cash flows are also presented.

b. After Tax Analysis

(1) Computation of Depreciation, Investment Tax Credits, and Tax Savings for Old Method

This section of the model computes the depreciation, investment tax credits, and the tax savings from depreciation and non-depreciable business costs for the old method. The required input is the investment schedule for each class of depreciable property. A section is provided for an optional analysis of state and local tax impacts, to be custom designed by the user.

(2) Computation of Depreciation, Investment Tax Credits, and Tax Savings for New Method

This section performs the same function as the previous one, but for the new method. It computes the depreciation, investment tax credits, and the tax savings from depreciation and non-depreciable business costs for the new method. The required input is the investment schedule for each class of depreciable property. A section is provided for an optional analysis of state and local tax impacts, to be custom designed by the user.

(3) Summary of After Tax Analysis

This section brings together the results of the previous two sections to compute the annual and cumulative after-tax cash flow, undiscounted rate of return, a discounted cash flow analysis, and a discounted rate of return.

III. OPERATING INSTRUCTIONS

1. Overview

a. The user first inputs the costs under the old method of production for each year to be considered, and then under the robotic/FMS approach. A list of recommended cost elements is provided for guidance. The model then computes nominal cash flows, that is, the differences in costs. The user is then provided the option of considering differences in throughput between the two alternative methods. After this, there is an option for considering differences in value added at the workstation. The model then performs a before-tax analysis, providing undiscounted and discounted cash flows, internal rate of return, and net present value at a user specified discount rate.

b. An after-tax analysis is performed next. The user inputs the investment schedule for depreciable property, by asset class, for both the old and new methods. The model computes and compares between alternatives the investment tax credit and accelerated cost recovery system (ACRS) depreciation for each year, and the federal tax impact upon cash flow. Space is provided for custom-built analysis of state and local income taxes under both old and new methods. The last section is a summary report, providing before tax undiscounted cash flow, and the impact upon cash flow from investment tax credits, depreciation, federal income taxes, and state and local taxes. After tax cash flow is presented by year, as is cumulative cash flow. The after tax internal rate of return is presented, as is the net present value of the investment, per a user-specified discount rate. Lastly, after tax discounted cash flow is presented by year, and cumulatively by year.

2. Detailed Instructions

This section addresses each of the major sections of the model.

a. "OLD METHOD COST ELEMENTS" and "NEW METHOD COST ELEMENTS"

(1) The first and most important step in using the model is to input the costs of the two alternative manufacturing approaches (the old method and the new method). A separate area of the spreadsheet is provided for each alternative. Cost elements important for robotics/FMS applications are provided for guidance. The user may wish to change some of these to reflect company cost tracking and reporting categories, or special aspects of the manufacturing application. The user should feel free to modify the categories as needed, but should be careful that doing so does not lead to double counting. The yearly cost totals should be checked to ensure this.

(2) For cases where a robotic/FMS technology replaces several work stations, the appropriate costs from each of the old method work stations should be summed to yield a cell total for the old method. Lotus 1-2-3 allows the user to perform this on the worksheet, within each cell. Lotus also facilitates extrapolation of costs into the future, since it allows extrapolation formulas to be copied across rows. The analysis may be performed in either nominal or constant dollars.

(3) Where costs for the old method and new method are the same, the cells may be left empty. This will not affect the economic analysis results. It will result in a distortion of the per unit cost under each method, but the per unit cost difference will not be distorted.

b. "CASH FLOW FROM INVESTMENT"

(1) The third area on the spreadsheet presents the cash flows that would result from moving from the old method to the new method of manufacture. The cell formulas are "plus OLD METHOD minus NEW METHOD", except for salvage value which is a revenue generator, and therefore its formula is "plus NEW METHOD minus OLD METHOD". If a cost is higher under the new method than the old, the cash flow is negative. If a cost is lower, the cash flow is positive. For salvage value, the relationship is reversed. The "CASH FLOW FROM INVESTMENT" table shows the cash flows for individual cost elements, and summarizes them for each year in the analysis period.

c. "PRODUCTION QUANTITY ADJUSTMENT (BEFORE TAX)"

(1) This portion of the model provides the user with the option of considering differences in throughput between the old method and new method. The user exercises this option by entering the throughput for each year of the analysis period, for both the old and new method. The model computes for each year the change in throughput, the percentage change in throughput, the change in production cost per unit, the percentage change in production cost per unit, and the cash flow as modified by the throughput effect.

d. "ADJUSTMENT FOR CHANGES IN QUALITY OR VALUE ADDED"

(1) After the quantity adjustment option, the user is provided the option of adjusting the cash flows for differences in value added at the work station. Differences in value added might result from doing more or less work at the workstation under the new method than under the old method, and/or doing the work in such a way as to yield a higher or lower quality finished or intermediate product. For the user to exercize this option, he must enter for

each year the change in value added at the work station, either positive or negative, which will result from the substitution of the new method for the old method of production. This amount can be determined external to the model, or internally by using a formula that references information already on the spreadsheet. For example, change in value added might be entered as a percentage of production cost per unit, referencing this cell in the previous section.

(2) After the section for the value added adjustment, the model presents the impact of the value added upon cash flow for each year, the new annual cash flow, and, in order to indicate the breakeven period, cumulative cash flow for each year in the analysis period. The internal rate of return is presented next, along with the net present value of the investment. The discount rate for this last computation is entered by the user. The default value for the discount rate is 20%. Annual and cumulative discounted cash flows are also presented.

e. "AFTER TAX ANALYSIS", "COMPUTATION OF DEPRECIATION AND INVESTMENT TAX CREDITS"

(1) In this section, the user first inputs the investment schedule for depreciable property, under both the old and new methods. The user inputs the company's investment in each ACRS class of property (3 year, 5 year, 10 year, and 15 year) for each year of the analysis period. The model computes the investment tax credit, the allowable depreciation for each year, and the resulting tax savings. The only limitation in the depreciation section is that the model assumes all investment in 15 year property (real property) is made within the first three years of the project's life. Space has been left in the spreadsheet, under both the old and new methods, for the user to perform, at his

option, a custom analysis of state and local income tax impacts.

f. "SUMMARY OF AFTER TAX ANALYSIS"

(1) This is the last section of the model. It presents a summary of the analysis results and contains the information for comparing the economic attractiveness of the two alternatives, and for selecting the preferred option. It presents for each year of the analysis period the before-tax undiscounted cash flow, and the impact upon this cash flow of each of the tax impacts. The undiscounted, after tax rate of return is computed as is the net present value of the investment at the user-specified discount rate.

(2) The model then computes the annual and cumulative discounted after tax cash flows, and the discounted after tax rate of return.

Appendix A

Sample RIDM Application

ROBOTICS/FMS INVESTMENT
DECISION MODEL
(Lotus 1-2-3 FLEXIBLE)

OLD METHOD COST ELEMENTS	OLD METHOD YEAR 1	OLD METHOD YEAR 2	OLD METHOD YEAR 3	OLD METHOD YEAR 4	OLD METHOD YEAR 5	OLD METHOD YEAR 6	OLD METHOD YEAR 7	OLD METHOD YEAR 8	OLD METHOD YEAR 9	OLD METHOD YEAR 10	OLD METHOD YEAR 11	OLD METHOD YEAR 12	OLD METHOD YEAR 13	OLD METHOD YEAR 14	OLD METHOD YEAR 15
Equipment Purchase															
Equip. Ship. & Install.															
Special Tooling															
Fixtures															
Programming															
Supplies & Material	1500	1650	1815	1997	2196	2416	2657	2923	3215	3537	3891	4280	4708	5178	5696
Equipment Maintenance	5000	5500	6050	6655	7321	8053	8858	9744	10718	11790	12969	14266	15692	17261	18987
Equipment Repair			10000					12000					15000		
Equipment Overhaul															
Facilities Modifications															
Manufacturing Labor	75000	81000	87480	94478	102037	110700	119016	128537	138820	149925	161919	174873	188863	203972	220290
Engineering Labor	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332	2518	2720	2937
Production Control	5000	5400	5832	6299	6802	7347	7934	8569	9255	9995	10795	11658	12591	13598	14686
Shop Supervision															
Material Handling															
Inspection															
Training															
Inventory Costs	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000	10000
Scrap & Rework	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000	15000
Floor Space Costs															
Other MFG. Overhead Costs															
Engineering Overhead															
Administrative Costs															
Property Taxes															
Utilities															
Interest (Cost of Borrowed $)															
Other Expenses															
Equipment Salvage Value															
TOTAL COST, OLD METHOD	$112,500.00	$119,630.00	$137,343.40	$135,688.17	$144,716.26	$154,493.89	$165,051.97	$188,496.43	$188,858.67	$202,246.03	$216,732.25	$232,408.02	$264,371.56	$286,729.28	$287,596.42

NEW METHOD COST ELEMENTS	NEW METHOD YEAR 1	NEW METHOD YEAR 2	NEW METHOD YEAR 3	NEW METHOD YEAR 4	NEW METHOD YEAR 5	NEW METHOD YEAR 6	NEW METHOD YEAR 7	NEW METHOD YEAR 8	NEW METHOD YEAR 9	NEW METHOD YEAR 10	NEW METHOD YEAR 11	NEW METHOD YEAR 12	NEW METHOD YEAR 13	NEW METHOD YEAR 14	NEW METHOD YEAR 15
Equipment Purchase	350000														
Equip. Ship. & Install.	50000														
Special Tooling	70000														
Fixtures	10000														
Programming	30000														
Supplies & Material															
Equipment Maintenance	10000	3000	3090	2630	3093	4392	4832	5315	5846	6431	7074	7781	8559	9415	10357
Equipment Repair	5000	3000	3090	2630	3093	4392	4832	5315	5846	6431	7074	7781	8559	9415	10357
Equipment Overhaul															
Facilities Modifications	15000	-													
Manufacturing Labor	20000	21600	23328	25194	27210	29387	31737	34276	37019	39980	43178	46633	50363	54392	58744
Engineering Labor	2500	2700	2916	3149	3401	3673	3967	4285	4627	4998	5397	5829	6295	6799	7343
Production Control	1000	1080	1166	1260	1360	1469	1587	1714	1851	1999	2159	2332	2518	2720	2937
Shop Supervision															
Material Handling															
Inspection															
Training															
Inventory Costs	3000	3150	3308	3473	3647	3829	4020	4221	4432	4654	4887	5131	5388	5657	5940
Scrap & Rework	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000	3000
Floor Space Costs															
Other MFG. Overhead Costs															
Engineering Overhead															
Administrative Costs															
Property Taxes															
Utilities															
Interest (Cost of Borrowed $)															
Other Expenses															
Equipment Salvage Value	50000														
TOTAL COST, NEW METHOD	$519,500.00	$37,530.00	$40,217.40	$43,376.11	$46,674.01	$50,142.65	$53,974.89	$58,175.54	$62,621.53	$67,492.13	$72,769.11	$78,496.99	$84,683.27	$91,399.68	$98,672.47

CASH FLOW FROM INVESTMENT

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
Equipment Purchase	-350000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equip. Ship. & Install.	-50000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Special Tooling	-70000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fixtures	-10000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Programming	-30000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Supplies & Material	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Maintenance	-8500	-1350	-1485	-1634	-1797	-1977	-2174	-2392	-2631	-2894	-3183	-3502	-3852	-4237	-4661
Equipment Repair	0	2500	2750	3025	3328	3660	4026	4429	4872	5359	5895	6484	7133	7846	8631
Equipment Overhaul	0	0	10000	0	0	0	0	12000	0	0	0	0	15000	0	0
Facilities Modifications	-15000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Manufacturing Labor	55000	59400	64152	69284	74827	80813	87278	94260	101801	109945	118741	128240	138499	149579	161546
Engineering Labor	-1500	-1620	-1750	-1890	-2041	-2204	-2380	-2571	-2776	-2999	-3238	-3497	-3777	-4079	-4406
Production Control	4000	4320	4666	5039	5442	5877	6347	6855	7404	7996	8636	9327	10073	10878	11749
Shop Supervision	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Material Handling	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inspection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Training	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inventory Costs	7800	6850	6693	6527	6353	6171	5980	5779	5568	5346	5113	4869	4612	4343	4060
Scrap & Rework	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000	12000
Floor Space Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other MFG. Overhead Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Engineering Overhead	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Administrative Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Property Taxes	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Utilities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Interest (Cost of borrowed $)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Expenses	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Equipment Salvage Value	50000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NET CASH FLOW (NCF)	($407,000.00)	$92,100.00	$97,025.50	$92,352.07	$98,112.25	$104,341.23	$111,077.07	$130,360.89	$126,237.15	$134,753.91	$142,963.14	$153,921.03	$179,698.30	$178,330.61	$188,918.95

PRODUCTION QUANTITY ADJUSTMENT
(BEFORE TAX)

PRODUCTION QUANTITY, OLD METHOD	OLD METHOD YEAR 1	OLD METHOD YEAR 2	OLD METHOD YEAR 3	OLD METHOD YEAR 4	OLD METHOD YEAR 5	OLD METHOD YEAR 6	OLD METHOD YEAR 7	OLD METHOD YEAR 8	OLD METHOD YEAR 9	OLD METHOD YEAR 10	OLD METHOD YEAR 11	OLD METHOD YEAR 12	OLD METHOD YEAR 13	OLD METHOD YEAR 14	OLD METHOD YEAR 15
GROSS ANNUAL THROUGHPUT (GAT)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
ITEM A															
ITEM B															
ITEM C															
AVERAGE COST PER UNIT(CPU)	$112.50	$119.63	$127.34	$135.69	$144.72	$154.48	$165.05	$176.49	$188.86	$202.25	$216.73	$232.41	$249.37	$267.73	$287.60

PRODUCTION QUANTITY, NEW METHOD	NEW METHOD YEAR 1	NEW METHOD YEAR 2	NEW METHOD YEAR 3	NEW METHOD YEAR 4	NEW METHOD YEAR 5	NEW METHOD YEAR 6	NEW METHOD YEAR 7	NEW METHOD YEAR 8	NEW METHOD YEAR 9	NEW METHOD YEAR 10	NEW METHOD YEAR 11	NEW METHOD YEAR 12	NEW METHOD YEAR 13	NEW METHOD YEAR 14	NEW METHOD YEAR 15
GROSS ANNUAL THROUGHPUT (GAT)	300	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
ITEM A															
ITEM B															
ITEM C															
AVERAGE COST PER UNIT(CPU)	$1,731.67	$30.02	$32.25	$38.67	$37.28	$40.11	$43.18	$46.50	$50.10	$53.99	$58.22	$62.78	$67.75	$73.12	$78.88

PRODUCTION QUANTITY ADJUSTMENT RESULTS
NEW METHOD AS COMPARED TO OLD METHOD

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
CHANGE IN GROSS THROUGHPUT	-700	250	250	250	250	250	250	250	250	250	250	250	250	250	250
% CHANGE IN GROSS THROUGHPUT	-70.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%	25.0%
CHANGE IN PRODUCTION COST/UNIT	$1,619.17	($89.61) ✓	($105.09)	($101.02)	($107.43)	($110.37)	($121.87)	($141.99)	($138.76)	($148.25)	($158.52)	($169.62)	($196.62)	($194.61)	($208.65)
% CHANGE IN PROD COST/UNIT	1439.3%	-74.9%	-76.5%	-74.6%	-74.2%	-74.0%	-73.8%	-75.3%	-73.5%	-73.3%	-73.1%	-73.0%	-74.4%	-72.7%	-72.6%
CASH FLOW AFTER ADJUSTMENT FROM CHANGE IN PROD QUANTITY	($485,750.00)	$112,007.50	$131,381.35	$128,278.11	$134,291.31	$142,962.21	$157,340.06	$177,492.50	$173,451.81	$185,315.62	$198,146.21	$212,023.03	$245,781.19	$243,262.93	$260,810.06

ADJUSTMENT FOR CHANGES IN QUALITY OR VALUE ADDED

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
CHANGE IN VALUE ADDED PER UNIT AT THE WORK STATION UNDER NEW METHOD	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CASH FLOW IMPACT OF VAL ADDED	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
CASH FLOW, VAL ADDED ADJUSTED	($485,750.0)	$112,097.5	$131,361.4	$126,270.1	$134,291.3	$142,962.2	$152,340.1	$177,482.5	$173,451.8	$185,315.4	$198,146.2	$212,023.0	$245,781.2	$293,262.9	$260,818.1
CUM CASH FLOW, VAL ADD ADJSTED	($485,750.0)	($373,742.51)	($242,381.2)	($116,107.0)	$18,184.3	$161,146.5	$313,486.5	$490,969.0	$664,420.9	$849,736.3	$1,047,882.5	$1,259,905.5	$1,505,686.7	$1,798,949.6	$2,059,767.7

INTERNAL RATE OF RETURN	0.20
DISCOUNT RATE =	0.20
NPV OF INVESTMENT	$168,385.78

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
DISCOUNTED CASH FLOW (CONTINUOUS DISCOUNTING)	($397,699.48)	$75,090.87	$72,092.64	$56,738.61	$49,403.01	$43,059.39	$37,566.60	$35,833.10	$28,671.39	$25,079.71	$21,955.23	$19,234.30	$18,255.05	$14,792.83	$12,985.37
DISCOUNTED CUM. CASH FLOW	($397,699.48)	($322,617.59)	($250,524.95)	($193,786.34)	($144,383.33)	($101,323.94)	($63,757.34)	($27,924.24)	$747.15	$25,826.86	$47,782.09	$67,016.39	$85,271.43	$100,964.27	$113,049.63

AFTER TAX ANALYSIS

COMPUTATION OF DEPRECIATION, INVESTMENT TAX CREDITS, & TAX SAVINGS

INVESTMENT IN DEPRECIABLE ASSETS	OLD METHOD YEAR 1	OLD METHOD YEAR 2	OLD METHOD YEAR 3	OLD METHOD YEAR 4	OLD METHOD YEAR 5	OLD METHOD YEAR 6	OLD METHOD YEAR 7	OLD METHOD YEAR 8	OLD METHOD YEAR 9	OLD METHOD YEAR 10	OLD METHOD YEAR 11	OLD METHOD YEAR 12	OLD METHOD YEAR 13	OLD METHOD YEAR 14	OLD METHOD YEAR 15
3 Yr Property (Speci. Tooling)															
5 Yr. Property (Mast Equipt.)															
10 Yr Property															
15 Yr. Property (Facilities)															
TOT DEPRECIABLE INVESTMENT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
COMPUTE FED INVEST TAX CREDITS:															
3 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOT FED INVESTMENT TAX CREDIT	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DEPRECIATION 1ST YR BASIS															
3 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMPUTE ANNUAL DEPRECIATION:															
3 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
ANNUAL DEPRECIATION	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
FED TAX SAVINGS FROM DEPREC.	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
FED TAX SAVINGS FROM NON-DEPRECIABLE BUSINESS COSTS	$15,525.00	$68,787.25	$79,972.46	$78,020.70	$83,211.85	$88,838.24	$94,904.89	$109,379.70	$108,593.74	$116,291.47	$124,621.04	$133,634.81	$152,013.65	$944.34	$165,367.94

	OLD METHOD YEAR 1	OLD METHOD YEAR 2	OLD METHOD YEAR 3	OLD METHOD YEAR 4	OLD METHOD YEAR 5	OLD METHOD YEAR 6	OLD METHOD YEAR 7	OLD METHOD YEAR 8	OLD METHOD YEAR 9	OLD METHOD YEAR 10	OLD METHOD YEAR 11	OLD METHOD YEAR 12	OLD METHOD YEAR 13	OLD METHOD YEAR 14	OLD METHOD YEAR 15

STATE & LOCAL INCOME TAXES

INVESTMENT IN DEPRECIABLE ASSETS	NEW METHOD YEAR 1	NEW METHOD YEAR 2	NEW METHOD YEAR 3	NEW METHOD YEAR 4	NEW METHOD YEAR 5	NEW METHOD YEAR 6	NEW METHOD YEAR 7	NEW METHOD YEAR 8	NEW METHOD YEAR 9	NEW METHOD YEAR 10	NEW METHOD YEAR 11	NEW METHOD YEAR 12	NEW METHOD YEAR 13	NEW METHOD YEAR 14	NEW METHOD YEAR 15
3 Yr Property (Specl. Tooling)	70000														
5 Yr. Property (Mnf Equipt.)	360000														
10 Yr Property															
15 Yr. Property (Facilities)	15000														
TOT DEPRECIABLE INVESTMENT	$445,000.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
COMPUTE FED INVEST TAX CREDITS:															
3 Yr Property	4200	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Yr Property	36000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Yr Property	1500	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOT FED INVESTMENT TAX CREDIT	$41,700.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DEPRECIATION 1ST YR BASIS															
3 Yr Property	67900	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Yr Property	342000	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Yr Property	14250	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COMPUTE ANNUAL DEPRECIATION:															
3 Yr Property	16975	25802	25123	0	0	0	0	0	0	0	0	0	0	0	0
5 Yr Property	51300	75240	71820	71820	71820	0	0	0	0	0	0	0	0	0	0
10 Yr Property	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15 Yr Property	1710	1425	1283	1140	998	855	855	855	855	713	713	713	713	713	713
ANNUAL DEPRECIATION	$69,985.00	$102,467.00	$98,225.50	$72,960.00	$72,817.50	$855.00	$855.00	$855.00	$855.00	$712.50	$712.50	$712.50	$712.50	$712.50	$712.50
FED TAX SAVINGS FROM DEPREC.	$32,193.10	$47,134.82	$45,183.73	$33,561.60	$32,496.05	$393.30	$393.30	$393.30	$393.30	$327.75	$327.75	$327.75	$327.75	$327.75	$327.75
FED TAX SAVINGS FROM NON-DEPRECIABLE BUSINESS COSTS	$34,270.90	$17,263.80	$18,546.23	$19,924.61	$21,437.84	$23,065.62	$24,820.45	$26,737.75	$28,805.90	$31,046.38	$33,473.79	$36,104.02	$38,954.38	$42,043.39	$45,381.64

	NEW METHOD YEAR 1	NEW METHOD YEAR 2	NEW METHOD YEAR 3	NEW METHOD YEAR 4	NEW METHOD YEAR 5	NEW METHOD YEAR 6	NEW METHOD YEAR 7	NEW METHOD YEAR 8	NEW METHOD YEAR 9	NEW METHOD YEAR 10	NEW METHOD YEAR 11	NEW METHOD YEAR 12	NEW METHOD YEAR 13	NEW METHOD YEAR 14	NEW METHOD YEAR 15
STATE & LOCAL INCOME TAXES															

SUMMARY OF AFTER TAX ANALYSIS:

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
BEFORE TAX UNDISC CASH FLOW	($985,750.00)	$112,007.50	$131,261.35	$126,279.11	$134,291.31	$142,962.21	$152,390.06	$177,982.50	$173,951.81	$185,315.42	$198,196.21	$212,023.03	$245,781.19	$262,262.93	$280,819.06
ADJUSTMENTS TO CASH FLOW FROM TAX IMPACTS:															
NON-DEPRECIABLE BUSINESS COSTS	$18,745.00	($5,523.45)	$60,426.22)	($58,086.09)	($61,779.00)	($65,762.62)	($70,076.93)	($81,691.95)	($79,787.83)	($85,245.09)	($91,147.25)	($97,530.59)	($113,059.35)	($121,990.95)	($119,976.31)
INVESTMENT TAX CREDIT	$41,700.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
DEPRECIATION DEDUCTIONS	$32,193.10	$47,119.82	$45,185.73	$33,561.60	$33,896.05	$393.30	$393.30	$393.30	$393.30	$327.75	$327.75	$327.75	$327.75	$327.75	$327.75
STATE & LOCAL TAXES	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00	$0.00
AFTER TAX CASH FLOW (UNDISC)	($393,111.90)	$107,618.87	$116,113.96	$101,749.62	$106,013.36	$77,592.89	$82,656.93	$96,233.85	$94,057.28	$100,398.08	$107,326.70	$114,820.19	$133,049.59	$141,599.73	$161,169.50
AFTER TAX CASH FLOW CUMULATIVE (UNDISC)	($393,111.90)	($285,493.03)	($169,379.07)	($67,629.55)	$38,383.80	$115,981.70	$198,638.63	$294,872.48	$388,929.76	$489,327.83	$596,654.54	$711,474.72	$844,524.31	$986,124.05	$1,147,293.55
INTERNAL RATE OF RETURN (AFTER TAX, UNDISC)	0.252														
DISCOUNTED CASH FLOW ANALYSIS:															
DISCOUNT RATE:	0.20														
	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6	YEAR 7	YEAR 8	YEAR 9	YEAR 10	YEAR 11	YEAR 12	YEAR 13	YEAR 14	YEAR 15
AFTER TAX DISCOUNTED CASH FLOW (CONTINUOUS DISCOUNTING)	($321,852.90)	$72,139.09	$63,727.38	$45,719.05	$39,000.13	$23,370.53	$20,382.95	$19,929.28	$15,547.56	$13,587.40	$11,892.19	$10,416.25	$9,992.07	$8,999.06	$7,028.92
CUMULATIVE DISCOUNTED CASH FLOW, AFTER TAX, CON'T DISC	($321,852.80)	($249,713.72)	($185,986.34)	($140,267.28)	($101,267.15)	($77,896.62)	($57,513.67)	($38,084.39)	($22,536.83)	($8,949.43)	$2,992.71	$13,358.96	$23,291.03	$32,249.09	$39,277.51
INTERNAL RATE OF RETURN (AFTER TAX, DISCOUNTED)	0.025														

Appendix B

Program Listing

```
A1: 'ROBOTICS/FMS INVESTMENT
A2: 'DECISION MODEL
A3: '(Lotus 1-2-3 FLN:RIDM)
A8: 'OLD METHOD
B8: "OLD METHOD
C8: "OLD METHOD
D8: "OLD METHOD
E8: "OLD METHOD
F8: "OLD METHOD
A9: 'COST ELEMENTS
B9: "YEAR 1
C9: "YEAR 2
D9: "YEAR 3
E9: "YEAR 4
F9: "YEAR 5
A11: 'Equipment Purchase
A12: 'Equip. Ship. & Install.
A13: 'Special Tooling
A14: 'Fixtures
A15: 'Programming
A16: 'Supplied & Material
A17: 'Equipment Maintenance
A18: 'Equipment Repair
A19: 'Equipment Overhaul
A20: 'Facilities Modifications
A21: 'Manufacturing Labor
A22: 'Engineering Labor
A23: 'Production Control
A24: 'Shop Supervision
A25: 'Material Handling
A26: 'Inspection
A27: 'Training
A28: 'Inventory Costs
A29: 'Scrap & Rework
A30: 'Floor Space Costs
A31: 'Other MFG. Overhead Costs
A32: 'Engineering Overhead
A33: 'Administrative Costs
A34: 'Property Taxes
A35: 'Utilities
A36: 'Interest (Cost of borrowed $)
A37: 'Other Expenses
A39: 'Equipment Salvage Value
A41: 'TOTAL COST, OLD METHOD
B41: (C2) @SUM(B37..B11)-B39
C41: (C2) @SUM(C37..C11)-C39
D41: (C2) @SUM(D37..D11)-D39
E41: (C2) @SUM(E37..E11)-E39
F41: (C2) @SUM(F37..F11)-F39
```

```
A43:  '- - - - - - - - - - - - - - - -
B43:  '- - - - - - - - - - - - - - - -
C43:  '- - - - - - - - - - - - - - - -
D43:  '- - - - - - - - - - - - - - - -
E43:  '- - - - - - - - - - - - - - - -
F43:  '- - - - - - - - - - - - - - - -
A45:  'NEW METHOD
B45:  "NEW METHOD
C45:  "NEW METHOD
D45:  "NEW METHOD
E45:  "NEW METHOD
F45:  "NEW METHOD
```

```
A1: 'ROBOTICS/FMS INVESTMENT
A2: 'DECISION MODEL
A3: '(Lotus 1-2-3 FLN:RIDM)
A8: 'OLD METHOD
B8: "OLD METHOD
C8: "OLD METHOD
D8: "OLD METHOD
E8: "OLD METHOD
F8: "OLD METHOD
A9: 'COST ELEMENTS
B9: "YEAR 1
C9: "YEAR 2
D9: "YEAR 3
E9: "YEAR 4
F9: "YEAR 5
A11: 'Equipment Purchase
A12: 'Equip. Ship. & Install.
A13: 'Special Tooling
A14: 'Fixtures
A15: 'Programming
A16: 'Supplied & Material
A17: 'Equipment Maintenance
A18: 'Equipment Repair
A19: 'Equipment Overhaul
A20: 'Facilities Modifications
A21: 'Manufacturing Labor
A22: 'Engineering Labor
A23: 'Production Control
A24: 'Shop Supervision
A25: 'Material Handling
A26: 'Inspection
A27: 'Training
A28: 'Inventory Costs
A29: 'Scrap & Rework
A30: 'Floor Space Costs
A31: 'Other MFG. Overhead Costs
A32: 'Engineering Overhead
A33: 'Administrative Costs
A34: 'Property Taxes
A35: 'Utilities
A36: 'Interest (Cost of borrowed $)
A37: 'Other Expenses
A39: 'Equipment Salvage Value
A41: 'TOTAL COST, OLD METHOD
B41: (C2) @SUM(B37..B11)-B39
C41: (C2) @SUM(C37..C11)-C39
D41: (C2) @SUM(D37..D11)-D39
E41: (C2) @SUM(E37..E11)-E39
F41: (C2) @SUM(F37..F11)-F39
A43: ' - - - - - - - - - - - - - - - - - -
B43: ' - - - - - - - - - - - - - - - - - -
C43: ' - - - - - - - - - - - - - - - - - -
D43: ' - - - - - - - - - - - - - - - - - -
E43: ' - - - - - - - - - - - - - - - - - -
F43: ' - - - - - - - - - - - - - - - - - -
A45: 'NEW METHOD
B45: "NEW METHOD
C45: "NEW METHOD
D45: "NEW METHOD
E45: "NEW METHOD
F45: "NEW METHOD
```

```
G45: "NEW METHOD
H45: "NEW METHOD
I45: "NEW METHOD
J45: "NEW METHOD
K45: "NEW METHOD
L45: "NEW METHOD
M45: "NEW METHOD
N45: "NEW METHOD
O45: "NEW METHOD
P45: "NEW METHOD
A46: 'COST ELEMENTS
B46: "YEAR 1
C46: "YEAR 2
D46: "YEAR 3
E46: "YEAR 4
F46: "YEAR 5
G46: "YEAR 6
H46: "YEAR 7
I46: "YEAR 8
J46: "YEAR 9
K46: "YEAR 10
L46: "YEAR 11
M46: "YEAR 12
N46: "YEAR 13
O46: "YEAR 14
P46: "YEAR 15
A48: 'Equipment Purchase
A49: 'Equip. Ship. & Install.
A50: 'Special Tooling
A51: 'Fixtures
A52: 'Programming
A53: 'Supplied & Material
A54: 'Equipment Maintenance
A55: 'Equipment Repair
A56: 'Equipment Overhaul
A57: 'Facilities Modifications
A58: 'Manufacturing Labor
A59: 'Engineering Labor
A60: 'Production Control
A61: 'Shop Supervision
A62: 'Material Handling
A63: 'Inspection
A64: 'Training
A65: 'Inventory Costs
A66: 'Scrap & Rework
A67: 'Floor Space Costs
A68: 'Other MFG. Overhead Costs
A69: 'Engineering Overhead
A70: 'Administrative Costs
A71: 'Property Taxes
```

```
A72:  'Utilities
A73:  'Interest (Cost of borrowed $)
A74:  'Other Expenses
A76:  'Equipment Salvage Value
A78:  'TOTAL COST, NEW METHOD
B78:  (C2) @SUM(B74..B48)-B76
C78:  (C2) @SUM(C74..C48)-C76
D78:  (C2) @SUM(D74..D48)-D76
E78:  (C2) @SUM(E74..E48)-E76
F78:  (C2) @SUM(F74..F48)-F76
G78:  (C2) @SUM(G74..G48)-G76
H78:  (C2) @SUM(H74..H48)-H76
I78:  (C2) @SUM(I74..I48)-I76
J78:  (C2) @SUM(J74..J48)-J76
K78:  (C2) @SUM(K74..K48)-K76
L78:  (C2) @SUM(L74..L48)-L76
M78:  (C2) @SUM(M74..M48)-M76
N78:  (C2) @SUM(N74..N48)-N76
O78:  (C2) @SUM(O74..O48)-O76
P78:  (C2) @SUM(P74..P48)-P76
A80:  \-
B80:  \-
C80:  \-
D80:  \-
E80:  \-
F80:  \-
G80:  \-
H80:  \-
I80:  \-
J80:  \-
K80:  \-
L80:  \-
M80:  \-
N80:  \-
O80:  \-
P80:  \-
A81:  'CASH FLOW FROM INVESTMENT
B83:  "YEAR 1
C83:  "YEAR 2
D83:  "YEAR 3
E83:  "YEAR 4
F83:  "YEAR 5
G83:  "YEAR 6
H83:  "YEAR 7
I83:  "YEAR 8
J83:  "YEAR 9
K83:  "YEAR 10
L83:  "YEAR 11
M83:  "YEAR 12
N83:  "YEAR 13
```

```
O83: "YEAR 14
P83: "YEAR 15
A85: 'Equipment Purchase
B85: +B11-B48
C85: +C11-C48
D85: +D11-D48
E85: +E11-E48
F85: +F11-F48
G85: +G11-G48
H85: +H11-H48
I85: +I11-I48
J85: +J11-J48
K85: +K11-K48
L85: +L11-L48
M85: +M11-M48
N85: +N11-N48
O85: +O11-O48
P85: +P11-P48
A86: 'Equip. Ship. & Install.
B86: +B12-B49
C86: +C12-C49
D86: +D12-D49
E86: +E12-E49
F86: +F12-F49
G86: +G12-G49
H86: +H12-H49
I86: +I12-I49
J86: +J12-J49
K86: +K12-K49
L86: +L12-L49
M86: +M12-M49
N86: +N12-N49
O86: +O12-O49
P86: +P12-P49
A87: 'Special Tooling
B87: +B13-B50
C87: +C13-C50
D87: +D13-D50
E87: +E13-E50
F87: +F13-F50
G87: +G13-G50
H87: +H13-H50
I87: +I13-I50
J87: +J13-J50
K87: +K13-K50
L87: +L13-L50
M87: +M13-M50
N87: +N13-N50
O87: +O13-O50
P87: +P13-P50
```

```
A88: 'Fixtures
B88: +B14-B51
C88: +C14-C51
D88: +D14-D51
E88: +E14-E51
F88: +F14-F51
G88: +G14-G51
H88: +H14-H51
I88: +I14-I51
J88: +J14-J51
K88: +K14-K51
L88: +L14-L51
M88: +M14-M51
N88: +N14-N51
O88: +O14-O51
P88: +P14-P51
A89: 'Programming
B89: +B15-B52
C89: +C15-C52
D89: +D15-D52
E89: +E15-E52
F89: +F15-F52
G89: +G15-G52
H89: +H15-H52
I89: +I15-I52
J89: +J15-J52
K89: +K15-K52
L89: +L15-L52
M89: +M15-M52
N89: +N15-N52
O89: +O15-O52
P89: +P15-P52
A90: 'Supplied & Material
B90: +B16-B53
C90: +C16-C53
D90: +D16-D53
E90: +E16-E53
F90: +F16-F53
G90: +G16-G53
H90: +H16-H53
I90: +I16-I53
J90: +J16-J53
K90: +K16-K53
L90: +L16-L53
M90: +M16-M53
N90: +N16-N53
O90: +O16-O53
P90: +P16-P53
A91: 'Equipment Maintenance
B91: +B17-B54
```

```
C91: +C17-C54
D91: +D17-D54
E91: +E17-E54
F91: +F17-F54
G91: +G17-G54
H91: +H17-H54
I91: +I17-I54
J91: +J17-J54
K91: +K17-K54
L91: +L17-L54
M91: +M17-M54
N91: +N17-N54
O91: +O17-O54
P91: +P17-P54
A92: 'Equipment Repair
B92: +B18-B55
C92: +C18-C55
D92: +D18-D55
E92: +E18-E55
F92: +F18-F55
G92: +G18-G55
H92: +H18-H55
I92: +I18-I55
J92: +J18-J55
K92: +K18-K55
L92: +L18-L55
M92: +M18-M55
N92: +N18-N55
O92: +O18-O55
P92: +P18-P55
A93: 'Equipment Overhaul
B93: +B19-B56
C93: +C19-C56
D93: +D19-D56
E93: +E19-E56
F93: +F19-F56
G93: +G19-G56
H93: +H19-H56
I93: +I19-I56
J93: +J19-J56
K93: +K19-K56
L93: +L19-L56
M93: +M19-M56
N93: +N19-N56
O93: +O19-O56
P93: +P19-P56
A94: 'Facilities Modifications
B94: +B20-B57
C94: +C20-C57
D94: +D20-D57
```

```
E94: +E20-E57
F94: +F20-F57
G94: +G20-G57
H94: +H20-H57
I94: +I20-I57
J94: +J20-J57
K94: +K20-K57
L94: +L20-L57
M94: +M20-M57
N94: +N20-N57
O94: +O20-O57
P94: +P20-P57
A95: 'Manufacturing Labor
B95: +B21-B58
C95: +C21-C58
D95: +D21-D58
E95: +E21-E58
F95: +F21-F58
G95: +G21-G58
H95: +H21-H58
I95: +I21-I58
J95: +J21-J58
K95: +K21-K58
L95: +L21-L58
M95: +M21-M58
N95: +N21-N58
O95: +O21-O58
P95: +P21-P58
A96: 'Engineering Labor
B96: +B22-B59
C96: +C22-C59
D96: +D22-D59
E96: +E22-E59
F96: +F22-F59
G96: +G22-G59
H96: +H22-H59
I96: +I22-I59
J96: +J22-J59
K96: +K22-K59
L96: +L22-L59
M96: +M22-M59
N96: +N22-N59
O96: +O22-O59
P96: +P22-P59
A97: 'Production Control
B97: +B23-B60
C97: +C23-C60
D97: +D23-D60
E97: +E23-E60
F97: +F23-F60
```

```
G97: +G23-G60
H97: +H23-H60
I97: +I23-I60
J97: +J23-J60
K97: +K23-K60
L97: +L23-L60
M97: +M23-M60
N97: +N23-N60
O97: +O23-O60
P97: +P23-P60
A98: 'Shop Supervision
B98: +B24-B61
C98: +C24-C61
D98: +D24-D61
E98: +E24-E61
F98: +F24-F61
G98: +G24-G61
H98: +H24-H61
I98: +I24-I61
J98: +J24-J61
K98: +K24-K61
L98: +L24-L61
M98: +M24-M61
N98: +N24-N61
O98: +O24-O61
P98: +P24-P61
A99: 'Material Handling
B99: +B25-B62
C99: +C25-C62
D99: +D25-D62
E99: +E25-E62
F99: +F25-F62
G99: +G25-G62
H99: +H25-H62
I99: +I25-I62
J99: +J25-J62
K99: +K25-K62
L99: +L25-L62
M99: +M25-M62
N99: +N25-N62
O99: +O25-O62
P99: +P25-P62
A100: 'Inspection
B100: +B26-B63
C100: +C26-C63
D100: +D26-D63
E100: +E26-E63
F100: +F26-F63
G100: +G26-G63
H100: +H26-H63
```

```
I100: +I26-I63
J100: +J26-J63
K100: +K26-K63
L100: +L26-L63
M100: +M26-M63
N100: +N26-N63
O100: +O26-O63
P100: +P26-P63
A1: 'ROBOTICS/FMS INVESTMENT
A2: 'DECISION MODEL
A3: '(Lotus 1-2-3 FLN:RIDM)
A5: 'OLD METHOD
B5: "OLD METHOD
C5: "OLD METHOD
D5: "OLD METHOD
E5: "OLD METHOD
F5: "OLD METHOD
G5: "OLD METHOD
H5: "OLD METHOD
I5: "OLD METHOD
J5: "OLD METHOD
K5: "OLD METHOD
L5: "OLD METHOD
M5: "OLD METHOD
N5: "OLD METHOD
O5: "OLD METHOD
P5: "OLD METHOD
A9: 'COST ELEMENTS
B9: "YEAR 1
C9: "YEAR 2
D9: "YEAR 3
E9: "YEAR 4
F9: "YEAR 5
G9: "YEAR 6
H9: "YEAR 7
I9: "YEAR 8
J9: "YEAR 9
K9: "YEAR 10
L9: "YEAR 11
M9: "YEAR 12
N9: "YEAR 13
O9: "YEAR 14
P9: "YEAR 15
A11: 'Equipment Purchase
A12: 'Equip. Ship. & Install.
A13: 'Special Tooling
A14: 'Fixtures
A15: 'Programming
A16: 'Supplied & Material
A17: 'Equipment Maintenance
```

```
A18: 'Equipment Repair
A19: 'Equipment Overhaul
A20: 'Facilities Modifications
A21: 'Manufacturing Labor
A22: 'Engineering Labor
A23: 'Production Control
A24: 'Shop Supervision
A25: 'Material Handling
A26: 'Inspection
A27: 'Training
A28: 'Inventory Costs
A29: 'Scrap & Rework
A30: 'Floor Space Costs
A31: 'Other MFG. Overhead Costs
A32: 'Engineering Overhead
A33: 'Administrative Costs
A34: 'Property Taxes
A35: 'Utilities
A36: 'Interest (Cost of borrowed $)
A37: 'Other Expenses
A39: 'Equipment Salvage Value
A41: 'TOTAL COST, OLD METHOD
B41: (C2) @SUM(B37..B11)-B39
C41: (C2) @SUM(C37..C11)-C39
D41: (C2) @SUM(D37..D11)-D39
E41: (C2) @SUM(E37..E11)-E39
F41: (C2) @SUM(F37..F11)-F39
G41: (C2) @SUM(G37..G11)-G39
H41: (C2) @SUM(H37..H11)-H39
I41: (C2) @SUM(I37..I11)-I39
J41: (C2) @SUM(J37..J11)-J39
K41: (C2) @SUM(K37..K11)-K39
L41: (C2) @SUM(L37..L11)-L39
M41: (C2) @SUM(M37..M11)-M39
N41: (C2) @SUM(N37..N11)-N39
O41: (C2) @SUM(O37..O11)-O39
P41: (C2) @SUM(P37..P11)-P39
A43: ' - - - - - - - - - - - - - - - - - -
B43: ' - - - - - - - - - - - - - - - - - -
C43: ' - - - - - - - - - - - - - - - - - -
D43: ' - - - - - - - - - - - - - - - - - -
E43: ' - - - - - - - - - - - - - - - - - -
F43: ' - - - - - - - - - - - - - - - - - -
G43: ' - - - - - - - - - - - - - - - - - -
H43: ' - - - - - - - - - - - - - - - - - -
I43: ' - - - - - - - - - - - - - - - - - -
J43: ' - - - - - - - - - - - - - - - - - -
K43: ' - - - - - - - - - - - - - - - - - -
L43: ' - - - - - - - - - - - - - - - - - -
M43: ' - - - - - - - - - - - - - - - - - -
```

```
N43: '- - - - - - - - - - - - - - - - - - - -
O43: '- - - - - - - - - - - - - - - - - - - -
P43: '- - - -
A45: 'NEW METHOD
B45: "NEW METHOD
C45: "NEW METHOD
D45: "NEW METHOD
E45: "NEW METHOD
F45: "NEW METHOD
G45: "NEW METHOD
H45: "NEW METHOD
I45: "NEW METHOD
J45: "NEW METHOD
K45: "NEW METHOD
L45: "NEW METHOD
M45: "NEW METHOD
N45: "NEW METHOD
O45: "NEW METHOD
P45: "NEW METHOD
A46: 'COST ELEMENTS
B46: "YEAR 1
C46: "YEAR 2
D46: "YEAR 3
E46: "YEAR 4
F46: "YEAR 5
G46: "YEAR 6
H46: "YEAR 7
I46: "YEAR 8
J46: "YEAR 9
K46: "YEAR 10
L46: "YEAR 11
M46: "YEAR 12
N46: "YEAR 13
O46: "YEAR 14
P46: "YEAR 15
A48: 'Equipment Purchase
A49: 'Equip. Ship. & Install.
A50: 'Special Tooling
A51: 'Fixtures
A52: 'Programming
A53: 'Supplied & Material
A54: 'Equipment Maintenance
A55: 'Equipment Repair
A56: 'Equipment Overhaul
A57: 'Facilities Modifications
A58: 'Manufacturing Labor
A59: 'Engineering Labor
A60: 'Production Control
A61: 'Shop Supervision
A62: 'Material Handling
```

```
A63: 'Inspection
A64: 'Training
A65: 'Inventory Costs
A66: 'Scrap & Rework
A67: 'Floor Space Costs
A68: 'Other MFG. Overhead Costs
A69: 'Engineering Overhead
A70: 'Administrative Costs
A71: 'Property Taxes
A72: 'Utilities
A73: 'Interest (Cost of borrowed $)
A74: 'Other Expenses
A76: 'Equipment Salvage Value
A78: 'TOTAL COST, NEW METHOD
B78: (C2) @SUM(B74..B48)-B76
C78: (C2) @SUM(C74..C48)-C76
D78: (C2) @SUM(D74..D48)-D76
E78: (C2) @SUM(E74..E48)-E76
F78: (C2) @SUM(F74..F48)-F76
G78: (C2) @SUM(G74..G48)-G76
H78: (C2) @SUM(H74..H48)-H76
I78: (C2) @SUM(I74..I48)-I76
J78: (C2) @SUM(J74..J48)-J76
K79: (C2) @SUM(K74..K48)-K76
L78: (C2) @SUM(L74..L48)-L76
M78: (C2) @SUM(M74..M48)-M76
N78: (C2) @SUM(N74..N48)-N76
O78: (C2) @SUM(O74..O48)-O76
P78: (C2) @SUM(P74..P48)-P76
A80: \-
B80: \-
C80: \-
D80: \-
E80: \-
F80: \-
G80: \-
H80: \-
I80: \-
J80: \-
K80: \-
L80: \-
M80: \-
N80: \-
O80: \-
P80: \-
A81: 'CASH FLOW FROM INVESTMENT
B83: "YEAR 1
C83: "YEAR 2
D83: "YEAR 3
E83: "YEAR 4
```

```
F83:  "YEAR 5
G83:  "YEAR 6
H83:  "YEAR 7
I83:  "YEAR 8
J83:  "YEAR 9
K83:  "YEAR 10
L83:  "YEAR 11
M83:  "YEAR 12
N83:  "YEAR 13
O83:  "YEAR 14
P83:  "YEAR 15
A85:  'Equipment Purchase
B85:  +B11-B48
C85:  +C11-C48
D85:  +D11-D48
E85:  +E11-E48
F85:  +F11-F48
G85:  +G11-G48
H85:  +H11-H48
I85:  +I11-I48
J85:  +J11-J48
K85:  +K11-K48
L85:  +L11-L48
M85:  +M11-M48
N85:  +N11-N48
O85:  +O11-O48
P85:  +P11-P48
A86:  'Equip. Ship. & Install.
B86:  +B12-B49
C86:  +C12-C49
D86:  +D12-D49
E86:  +E12-E49
F86:  +F12-F49
G86:  +G12-G49
H86:  +H12-H49
I86:  +I12-I49
J86:  +J12-J49
K86:  +K12-K49
L86:  +L12-L49
M86:  +M12-M49
N86:  +N12-N49
O86:  +O12-O49
P86:  +P12-P49
A87:  'Special Tooling
B87:  +B13-B50
C87:  +C13-C50
D87:  +D13-D50
E87:  +E13-E50
F87:  +F13-F50
G87:  +G13-G50
```

```
H87: +H13-H50
I87: +I13-I50
J87: +J13-J50
K87: +K13-K50
L87: +L13-L50
M87: +M13-M50
N87: +N13-N50
O87: +O13-O50
P87: +P13-P50
A88: 'Fixtures
B88: +B14-B51
C88: +C14-C51
D88: +D14-D51
E88: +E14-E51
F88: +F14-F51
G88: +G14-G51
H88: +H14-H51
I88: +I14-I51
J88: +J14-J51
K88: +K14-K51
L88: +L14-L51
M88: +M14-M51
N88: +N14-N51
O88: +O14-O51
P88: +P14-P51
A89: 'Programming
B89: +B15-B52
C89: +C15-C52
D89: +D15-D52
E89: +E15-E52
F89: +F15-F52
G89: +G15-G52
H89: +H15-H52
I89: +I15-I52
J89: +J15-J52
K89: +K15-K52
L89: +L15-L52
M89: +M15-M52
N89: +N15-N52
O89: +O15-O52
P89: +P15-P52
A90: 'Supplied & Material
B90: +B16-B53
C90: +C16-C53
D90: +D16-D53
E90: +E16-E53
F90: +F16-F53
G90: +G16-G53
H90: +H16-H53
I90: +I16-I53
```

```
J90: +J16-J53
K90: +K16-K53
L90: +L16-L53
M90: +M16-M53
N90: +N16-N53
O90: +O16-O53
P90: +P16-P53
A91: 'Equipment Maintenance
B91: +B17-B54
C91: +C17-C54
D91: +D17-D54
E91: +E17-E54
F91: +F17-F54
G91: +G17-G54
H91: +H17-H54
I91: +I17-I54
J91: +J17-J54
K91: +K17-K54
L91: +L17-L54
M91: +M17-M54
N91: +N17-N54
O91: +O17-O54
P91: +P17-P54
A92: 'Equipment Repair
B92: +B18-B55
C92: +C18-C55
D92: +D18-D55
E92: +E18-E55
F92: +F18-F55
G92: +G18-G55
H92: +H18-H55
I92: +I18-I55
J92: +J18-J55
K92: +K18-K55
L92: +L18-L55
M92: +M18-M55
N92: +N18-N55
O92: +O18-O55
P92: +P18-P55
A93: 'Equipment Overhaul
B93: +B19-B56
C93: +C19-C56
D93: +D19-D56
E93: +E19-E56
F93: +F19-F56
G93: +G19-G56
H93: +H19-H56
I93: +I19-I56
J93: +J19-J56
K93: +K19-K56
```

```
L93: +L19-L56
M93: +M19-M56
N93: +N19-N56
O93: +O19-O56
P93: +P19-P56
A94: 'Facilities Modifications
B94: +B20-B57
C94: +C20-C57
D94: +D20-D57
E94: +E20-E57
F94: +F20-F57
G94: +G20-G57
H94: +H20-H57
I94: +I20-I57
J94: +J20-J57
K94: +K20-K57
L94: +L20-L57
M94: +M20-M57
N94: +N20-N57
O94: +O20-O57
P94: +P20-P57
A95: 'Manufacturing Labor
B95: +B21-B58
C95: +C21-C58
D95: +D21-D58
E95: +E21-E58
F95: +F21-F58
G95: +G21-G58
H95: +H21-H58
I95: +I21-I58
J95: +J21-J58
K95: +K21-K58
L95: +L21-L58
M95: +M21-M58
N95: +N21-N58
O95: +O21-O58
P95: +P21-P58
A96: 'Engineering Labor
B96: +B22-B59
C96: +C22-C59
D96: +D22-D59
E96: +E22-E59
F96: +F22-F59
G96: +G22-G59
H96: +H22-H59
I96: +I22-I59
J96: +J22-J59
K96: +K22-K59
L96: +L22-L59
M96: +M22-M59
```

```
N96: +N22-N59
O96: +O22-O59
P96: +P22-P59
A97: 'Production Control
B97: +B23-B60
C97: +C23-C60
D97: +D23-D60
E97: +E23-E60
F97: +F23-F60
G97: +G23-G60
H97: +H23-H60
I97: +I23-I60
J97: +J23-J60
K97: +K23-K60
L97: +L23-L60
M97: +M23-M60
N97: +N23-N60
O97: +O23-O60
P97: +P23-P60
A98: 'Shop Supervision
B98: +B24-B61
C98: +C24-C61
D98: +D24-D61
E98: +E24-E61
F98: +F24-F61
G98: +G24-G61
H98: +H24-H61
I98: +I24-I61
J98: +J24-J61
K98: +K24-K61
L98: +L24-L61
M98: +M24-M61
N98: +N24-N61
O98: +O24-O61
P98: +P24-P61
A99: 'Material Handling
B99: +B25-B62
C99: +C25-C62
D99: +D25-D62
E99: +E25-E62
F99: +F25-F62
G99: +G25-G62
H99: +H25-H62
I99: +I25-I62
J99: +J25-J62
K99: +K25-K62
L99: +L25-L62
M99: +M25-M62
N99: +N25-N62
O99: +O25-O62
```

```
P99: +P25-P62
A100: 'Inspection
B100: +B26-B63
C100: +C26-C63
D100: +D26-D63
E100: +E26-E63
F100: +F26-F63
G100: +G26-G63
H100: +H26-H63
I100: +I26-I63
J100: +J26-J63
K100: +K26-K63
L100: +L26-L63
M100: +M26-M63
N100: +N26-N63
O100: +O26-O63
P100: +P26-P63
A1: 'ROBOTICS/FMS INVESTMENT
A2: 'DECISION MODEL
A3: '(Lotus 1-2-3 FLN:RIDM)
A8: 'OLD METHOD
B8: "OLD METHOD
C8: "OLD METHOD
D8: "OLD METHOD
E8: "OLD METHOD
F8: "OLD METHOD
G8: "OLD METHOD
H8: "OLD METHOD
I8: "OLD METHOD
J8: "OLD METHOD
K8: "OLD METHOD
L8: "OLD METHOD
M8: "OLD METHOD
N8: "OLD METHOD
O8: "OLD METHOD
P8: "OLD METHOD
A9: 'COST ELEMENTS
B9: "YEAR 1
C9: "YEAR 2
D9: "YEAR 3
E9: "YEAR 4
F9: "YEAR 5
G9: "YEAR 6
H9: "YEAR 7
I9: "YEAR 8
J9: "YEAR 9
K9: "YEAR 10
L9: "YEAR 11
M9: "YEAR 12
N9: "YEAR 13
```

```
O9: "YEAR 14
P9: "YEAR 15
A11: 'Equipment Purchase
A12: 'Equip. Ship. & Install.
A13: 'Special Tooling
A14: 'Fixtures
A15: 'Programming
A16: 'Supplied & Material
A17: 'Equipment Maintenance
A18: 'Equipment Repair
A19: 'Equipment Overhaul
A20: 'Facilities Modifications
A21: 'Manufacturing Labor
A22: 'Engineering Labor
A23: 'Production Control
A24: 'Shop Supervision
A25: 'Material Handling
A26: 'Inspection
A27: 'Training
A28: 'Inventory Costs
A29: 'Scrap & Rework
A30: 'Floor Space Costs
A31: 'Other MFG. Overhead Costs
A32: 'Engineering Overhead
A33: 'Administrative Costs
A34: 'Property Taxes
A35: 'Utilities
A36: 'Interest (Cost of borrowed $)
A37: 'Other Expenses
A39: 'Equipment Salvage Value
A41: 'TOTAL COST, OLD METHOD
B41: (C2) @SUM(B37..B11)-B39
C41: (C2) @SUM(C37..C11)-C39
D41: (C2) @SUM(D37..D11)-D39
E41: (C2) @SUM(E37..E11)-E39
F41: (C2) @SUM(F37..F11)-F39
G41: (C2) @SUM(G37..G11)-G39
H41: (C2) @SUM(H37..H11)-H39
I41: (C2) @SUM(I37..I11)-I39
J41: (C2) @SUM(J37..J11)-J39
K41: (C2) @SUM(K37..K11)-K39
L41: (C2) @SUM(L37..L11)-L39
M41: (C2) @SUM(M37..M11)-M39
N41: (C2) @SUM(N37..N11)-N39
O41: (C2) @SUM(O37..O11)-O39
P41: (C2) @SUM(P37..P11)-P39
A43: ' - - - - - - - - - - - - - - - - - -
B43: ' - - - - - - - - - - - - - - - - - -
C43: ' - - - - - - - - - - - - - - - - - -
D43: ' - - - - - - - - - - - - - - - - - -
```

```
E43:  ' - - - - - - - - - - - - - - - - - -
F43:  ' - - - - - - - - - - - - - - - - - -
G43:  ' - - - - - - - - - - - - - - - - - -
H43:  ' - - - - - - - - - - - - - - - - - -
I43:  ' - - - - - - - - - - - - - - - - - -
J43:  ' - - - - - - - - - - - - - - - - - -
K43:  ' - - - - - - - - - - - - - - - - - -
L43:  ' - - - - - - - - - - - - - - - - - -
M43:  ' - - - - - - - - - - - - - - - - - -
N43:  ' - - - - - - - - - - - - - - - - - -
O43:  ' - - - - - - - - - - - - - - - - - -
P43:  ' - - -
A45:  'NEW METHOD
B45:  "NEW METHOD
C45:  "NEW METHOD
D45:  "NEW METHOD
E45:  "NEW METHOD
F45:  "NEW METHOD
G45:  "NEW METHOD
H45:  "NEW METHOD
I45:  "NEW METHOD
J45:  "NEW METHOD
K45:  "NEW METHOD
L45:  "NEW METHOD
M45:  "NEW METHOD
N45:  "NEW METHOD
O45:  "NEW METHOD
P45:  "NEW METHOD
A46:  'COST ELEMENTS
B46:  "YEAR 1
C46:  "YEAR 2
D46:  "YEAR 3
E46:  "YEAR 4
F46:  "YEAR 5
G46:  "YEAR 6
H46:  "YEAR 7
I46:  "YEAR 8
J46:  "YEAR 9
K46:  "YEAR 10
L46:  "YEAR 11
M46:  "YEAR 12
N46:  "YEAR 13
O46:  "YEAR 14
P46:  "YEAR 15
A48:  'Equipment Purchase
A49:  'Equip. Ship. & Install.
A50:  'Special Tooling
A51:  'Fixtures
A52:  'Programming
A53:  'Supplied & Material
```

```
A54: 'Equipment Maintenance
A55: 'Equipment Repair
A56: 'Equipment Overhaul
A57: 'Facilities Modifications
A58: 'Manufacturing Labor
A59: 'Engineering Labor
A60: 'Production Control
A61: 'Shop Supervision
A62: 'Material Handling
A63: 'Inspection
A64: 'Training
A65: 'Inventory Costs
A66: 'Scrap & Rework
A67: 'Floor Space Costs
A68: 'Other MFG. Overhead Costs
A69: 'Engineering Overhead
A70: 'Administrative Costs
A71: 'Property Taxes
A72: 'Utilities
A73: 'Interest (Cost of borrowed $)
A74: 'Other Expenses
A76: 'Equipment Salvage Value
A78: 'TOTAL COST, NEW METHOD
B78: (C2) @SUM(B74..B48)-B76
C78: (C2) @SUM(C74..C48)-C76
D78: (C2) @SUM(D74..D48)-D76
E78: (C2) @SUM(E74..E48)-E76
F78: (C2) @SUM(F74..F48)-F76
G78: (C2) @SUM(G74..G48)-G76
H78: (C2) @SUM(H74..H48)-H76
I78: (C2) @SUM(I74..I48)-I76
J78: (C2) @SUM(J74..J48)-J76
K78: (C2) @SUM(K74..K48)-K76
L78: (C2) @SUM(L74..L48)-L76
M78: (C2) @SUM(M74..M48)-M76
N78: (C2) @SUM(N74..N48)-N76
O78: (C2) @SUM(O74..O48)-O76
P78: (C2) @SUM(P74..P48)-P76
A80: \-
B80: \-
C80: \-
D80: \-
E80: \-
F80: \-
G80: \-
H80: \-
I80: \-
J80: \-
K80: \-
L80: \-
```

```
M80: \-
N80: \-
O80: \-
P80: \-
A81: 'CASH FLOW FROM INVESTMENT
B83: "YEAR 1
C83: "YEAR 2
D83: "YEAR 3
E83: "YEAR 4
F83: "YEAR 5
G83: "YEAR 6
H83: "YEAR 7
I83: "YEAR 8
J83: "YEAR 9
K83: "YEAR 10
L83: "YEAR 11
M83: "YEAR 12
N83: "YEAR 13
O83: "YEAR 14
P83: "YEAR 15
A85: 'Equipment Purchase
B85: +B11-B48
C85: +C11-C48
D85: +D11-D48
E85: +E11-E48
F85: +F11-F48
G85: +G11-G48
H85: +H11-H48
I85: +I11-I48
J85: +J11-J48
K85: +K11-K48
L85: +L11-L48
M85: +M11-M48
N85: +N11-N48
O85: +O11-O48
P85: +P11-P48
A86: 'Equip. Ship. & Install.
B86: +B12-B49
C86: +C12-C49
D86: +D12-D49
E86: +E12-E49
F86: +F12-F49
G86: +G12-G49
H86: +H12-H49
I86: +I12-I49
J86: +J12-J49
K86: +K12-K49
L86: +L12-L49
M86: +M12-M49
N86: +N12-N49
```

```
O86: +O12-O49
P86: +P12-P49
A87: 'Special Tooling
B87: +B13-B50
C87: +C13-C50
D87: +D13-D50
E87: +E13-E50
F87: +F13-F50
G87: +G13-G50
H87: +H13-H50
I87: +I13-I50
J87: +J13-J50
K87: +K13-K50
L87: +L13-L50
M87: +M13-M50
N87: +N13-N50
O87: +O13-O50
P87: +P13-P50
A88: 'Fixtures
B88: +B14-B51
C88: +C14-C51
D88: +D14-D51
E88: +E14-E51
F88: +F14-F51
G88: +G14-G51
H88: +H14-H51
I88: +I14-I51
J88: +J14-J51
K88: +K14-K51
L88: +L14-L51
M88: +M14-M51
N88: +N14-N51
O88: +O14-O51
P88: +P14-P51
A89: 'Programming
B89: +B15-B52
C89: +C15-C52
D89: +D15-D52
E89: +E15-E52
F89: +F15-F52
G89: +G15-G52
H89: +H15-H52
I89: +I15-I52
J89: +J15-J52
K89: +K15-K52
L89: +L15-L52
M89: +M15-M52
N89: +N15-N52
O89: +O15-O52
P89: +P15-P52
```

```
A90:  'Supplied & Material
B90:  +B16-B53
C90:  +C16-C53
D90:  +D16-D53
E90:  +E16-E53
F90:  +F16-F53
G90:  +G16-G53
H90:  +H16-H53
I90:  +I16-I53
J90:  +J16-J53
K90:  +K16-K53
L90:  +L16-L53
M90:  +M16-M53
N90:  +N16-N53
O90:  +O16-O53
P90:  +P16-P53
A91:  'Equipment Maintenance
B91:  +B17-B54
C91:  +C17-C54
D91:  +D17-D54
E91:  +E17-E54
F91:  +F17-F54
G91:  +G17-G54
H91:  +H17-H54
I91:  +I17-I54
J91:  +J17-J54
K91:  +K17-K54
L91:  +L17-L54
M91:  +M17-M54
N91:  +N17-N54
O91:  +O17-O54
P91:  +P17-P54
A92:  'Equipment Repair
B92:  +B18-B55
C92:  +C18-C55
D92:  +D18-D55
E92:  +E18-E55
F92:  +F18-F55
G92:  +G18-G55
H92:  +H18-H55
I92:  +I18-I55
J92:  +J18-J55
K92:  +K18-K55
L92:  +L18-L55
M92:  +M18-M55
N92:  +N18-N55
O92:  +O18-O55
P92:  +P18-P55
A93:  'Equipment Overhaul
B93:  +B19-B56
```

```
C93: +C19-C56
D93: +D19-D56
E93: +E19-E56
F93: +F19-F56
G93: +G19-G56
H93: +H19-H56
I93: +I19-I56
J93: +J19-J56
K93: +K19-K56
L93: +L19-L56
M93: +M19-M56
N93: +N19-N56
O93: +O19-O56
P93: +P19-P56
A94: 'Facilities Modifications
B94: +B20-B57
C94: +C20-C57
D94: +D20-D57
E94: +E20-E57
F94: +F20-F57
G94: +G20-G57
H94: +H20-H57
I94: +I20-I57
J94: +J20-J57
K94: +K20-K57
L94: +L20-L57
M94: +M20-M57
N94: +N20-N57
O94: +O20-O57
P94: +P20-P57
A95: 'Manufacturing Labor
B95: +B21-B58
C95: +C21-C58
D95: +D21-D58
E95: +E21-E58
F95: +F21-F58
G95: +G21-G58
H95: +H21-H58
I95: +I21-I58
J95: +J21-J58
K95: +K21-K58
L95: +L21-L58
M95: +M21-M58
N95: +N21-N58
O95: +O21-O58
P95: +P21-P58
A96: 'Engineering Labor
B96: +B22-B59
C96: +C22-C59
D96: +D22-D59
```

```
E96: +E22-E59
F96: +F22-F59
G96: +G22-G59
H96: +H22-H59
I96: +I22-I59
J96: +J22-J59
K96: +K22-K59
L96: +L22-L59
M96: +M22-M59
N96: +N22-N59
O96: +O22-O59
P96: +P22-P59
A97: 'Production Control
B97: +B23-B60
C97: +C23-C60
D97: +D23-D60
E97: +E23-E60
F97: +F23-F60
G97: +G23-G60
H97: +H23-H60
I97: +I23-I60
J97: +J23-J60
K97: +K23-K60
L97: +L23-L60
M97: +M23-M60
N97: +N23-N60
O97: +O23-O60
P97: +P23-P60
A98: 'Shop Supervision
B98: +B24-B61
C98: +C24-C61
D98: +D24-D61
E98: +E24-E61
F98: +F24-F61
G98: +G24-G61
H98: +H24-H61
I98: +I24-I61
J98: +J24-J61
K98: +K24-K61
L98: +L24-L61
M98: +M24-M61
N98: +N24-N61
O98: +O24-O61
P98: +P24-P61
A99: 'Material Handling
B99: +B25-B62
C99: +C25-C62
D99: +D25-D62
E99: +E25-E62
F99: +F25-F62
```

```
G99: +G25-G62
H99: +H25-H62
I99: +I25-I62
J99: +J25-J62
K99: +K25-K62
L99: +L25-L62
M99: +M25-M62
N99: +N25-N62
O99: +O25-O62
P99: +P25-P62
A100: 'Inspection
B100: +B26-B63
C100: +C26-C63
D100: +D26-D63
E100: +E26-E63
F100: +F26-F63
G100: +G26-G63
H100: +H26-H63
I100: +I26-I63
J100: +J26-J63
K100: +K26-K63
L100: +L26-L63
M100: +M26-M63
N100: +N26-N63
O100: +O26-O63
P100: +P26-P63
A1: 'ROBOTICS/FMS INVESTMENT
A2: 'DECISION MODEL
A3: '(Lotus 1-2-3 FLN:RIDM)
A8: 'OLD METHOD
B8: "OLD METHOD
C8: "OLD METHOD
D8: "OLD METHOD
E8: "OLD METHOD
F8: "OLD METHOD
G8: "OLD METHOD
H8: "OLD METHOD
I8: "OLD METHOD
J8: "OLD METHOD
K8: "OLD METHOD
L8: "OLD METHOD
M8: "OLD METHOD
N8: "OLD METHOD
O8: "OLD METHOD
P8: "OLD METHOD
A9: 'COST ELEMENTS
B9: "YEAR 1
C9: "YEAR 2
D9: "YEAR 3
E9: "YEAR 4
```

```
F9: "YEAR 5
G9: "YEAR 6
H9: "YEAR 7
I9: "YEAR 8
J9: "YEAR 9
K9: "YEAR 10
L9: "YEAR 11
M9: "YEAR 12
N9: "YEAR 13
O9: "YEAR 14
P9: "YEAR 15
A11: 'Equipment Purchase
A12: 'Equip. Ship. & Install.
A13: 'Special Tooling
A14: 'Fixtures
A15: 'Programming
A16: 'Supplied & Material
A17: 'Equipment Maintenance
A18: 'Equipment Repair
A19: 'Equipment Overhaul
A20: 'Facilities Modifications
A21: 'Manufacturing Labor
A22: 'Engineering Labor
A23: 'Production Control
A24: 'Shop Supervision
A25: 'Material Handling
A26: 'Inspection
A27: 'Training
A28: 'Inventory Costs
A29: 'Scrap & Rework
A30: 'Floor Space Costs
A31: 'Other MFG. Overhead Costs
A32: 'Engineering Overhead
A33: 'Administrative Costs
A34: 'Property Taxes
A35: 'Utilities
A36: 'Interest (Cost of borrowed $)
A37: 'Other Expenses
A39: 'Equipment Salvage Value
A41: 'TOTAL COST, OLD METHOD
B41: (C2) @SUM(B37..B11)-B39
C41: (C2) @SUM(C37..C11)-C39
D41: (C2) @SUM(D37..D11)-D39
E41: (C2) @SUM(E37..E11)-E39
F41: (C2) @SUM(F37..F11)-F39
G41: (C2) @SUM(G37..G11)-G39
H41: (C2) @SUM(H37..H11)-H39
I41: (C2) @SUM(I37..I11)-I39
J41: (C2) @SUM(J37..J11)-J39
K41: (C2) @SUM(K37..K11)-K39
```

```
L41:  (C2) @SUM(L37..L11)-L39
M41:  (C2) @SUM(M37..M11)-M39
N41:  (C2) @SUM(N37..N11)-N39
O41:  (C2) @SUM(O37..O11)-O39
P41:  (C2) @SUM(P37..P11)-P39
A43:  ' - - - - - - - - - - - - - - - - - - - -
B43:  ' - - - - - - - - - - - - - - - - - - - -
C43:  ' - - - - - - - - - - - - - - - - - - - -
D43:  ' - - - - - - - - - - - - - - - - - - - -
E43:  ' - - - - - - - - - - - - - - - - - - - -
F43:  ' - - - - - - - - - - - - - - - - - - - -
G43:  ' - - - - - - - - - - - - - - - - - - - -
H43:  ' - - - - - - - - - - - - - - - - - - - -
I43:  ' - - - - - - - - - - - - - - - - - - - -
J43:  ' - - - - - - - - - - - - - - - - - - - -
K43:  ' - - - - - - - - - - - - - - - - - - - -
L43:  ' - - - - - - - - - - - - - - - - - - - -
M43:  ' - - - - - - - - - - - - - - - - - - - -
N43:  ' - - - - - - - - - - - - - - - - - - - -
O43:  ' - - - - - - - - - - - - - - - - - - - -
P43:  ' - - -
A45:  'NEW METHOD
B45:  "NEW METHOD
C45:  "NEW METHOD
D45:  "NEW METHOD
E45:  "NEW METHOD
F45:  "NEW METHOD
G45:  "NEW METHOD
H45:  "NEW METHOD
I45:  "NEW METHOD
J45:  "NEW METHOD
K45:  "NEW METHOD
L45:  "NEW METHOD
M45:  "NEW METHOD
N45:  "NEW METHOD
O45:  "NEW METHOD
P45:  "NEW METHOD
A46:  'COST ELEMENTS
B46:  "YEAR 1
C46:  "YEAR 2
D46:  "YEAR 3
E46:  "YEAR 4
F46:  "YEAR 5
G46:  "YEAR 6
H46:  "YEAR 7
I46:  "YEAR 8
J46:  "YEAR 9
K46:  "YEAR 10
L46:  "YEAR 11
M46:  "YEAR 12
```

```
N46: "YEAR 13
O46: "YEAR 14
P46: "YEAR 15
A48: 'Equipment Purchase
A49: 'Equip. Ship. & Install.
A50: 'Special Tooling
A51: 'Fixtures
A52: 'Programming
A53: 'Supplied & Material
A54: 'Equipment Maintenance
A55: 'Equipment Repair
A56: 'Equipment Overhaul
A57: 'Facilities Modifications
A58: 'Manufacturing Labor
A59: 'Engineering Labor
A60: 'Production Control
A61: 'Shop Supervision
A62: 'Material Handling
A63: 'Inspection
A64: 'Training
A65: 'Inventory Costs
A66: 'Scrap & Rework
A67: 'Floor Space Costs
A68: 'Other MFG. Overhead Costs
A69: 'Engineering Overhead
A70: 'Administrative Costs
A71: 'Property Taxes
A72: 'Utilities
A73: 'Interest (Cost of borrowed $)
A74: 'Other Expenses
A76: 'Equipment Salvage Value
A78: 'TOTAL COST, NEW METHOD
B78: (C2) @SUM(B74..B48)-B76
C78: (C2) @SUM(C74..C48)-C76
D78: (C2) @SUM(D74..D48)-D76
E78: (C2) @SUM(E74..E48)-E76
F78: (C2) @SUM(F74..F48)-F76
G78: (C2) @SUM(G74..G48)-G76
H78: (C2) @SUM(H74..H48)-H76
I78: (C2) @SUM(I74..I48)-I76
J78: (C2) @SUM(J74..J48)-J76
K78: (C2) @SUM(K74..K48)-K76
L78: (C2) @SUM(L74..L48)-L76
M78: (C2) @SUM(M74..M48)-M76
N78: (C2) @SUM(N74..N48)-N76
O78: (C2) @SUM(O74..O48)-O76
P78: (C2) @SUM(P74..P48)-P76
A80: \-
B80: \-
C80: \-
```

```
D80: \-
E80: \-
F80: \-
G80: \-
H80: \-
I80: \-
J80: \-
K80: \-
L80: \-
M80: \-
N80: \-
O80: \-
P80: \-
A81: 'CASH FLOW FROM INVESTMENT
B83: "YEAR 1
C83: "YEAR 2
D83: "YEAR 3
E83: "YEAR 4
F83: "YEAR 5
G83: "YEAR 6
H83: "YEAR 7
I83: "YEAR 8
J83: "YEAR 9
K83: "YEAR 10
L83: "YEAR 11
M83: "YEAR 12
N83: "YEAR 13
O83: "YEAR 14
P83: "YEAR 15
A85: 'Equipment Purchase
B85: +B11-B48
C85: +C11-C48
D85: +D11-D48
E85: +E11-E48
F85: +F11-F48
G85: +G11-G48
H85: +H11-H48
I85: +I11-I48
J85: +J11-J48
K85: +K11-K48
L85: +L11-L48
M85: +M11-M48
N85: +N11-N48
O85: +O11-O48
P85: +P11-P48
A86: 'Equip. Ship. & Install.
B86: +B12-B49
C86: +C12-C49
D86: +D12-D49
E86: +E12-E49
```

```
F86: +F12-F49
G86: +G12-G49
H86: +H12-H49
I86: +I12-I49
J86: +J12-J49
K86: +K12-K49
L86: +L12-L49
M86: +M12-M49
N86: +N12-N49
O86: +O12-O49
P86: +P12-P49
A87: 'Special Tooling
B87: +B13-B50
C87: +C13-C50
D87: +D13-D50
E87: +E13-E50
F87: +F13-F50
G87: +G13-G50
H87: +H13-H50
I87: +I13-I50
J87: +J13-J50
K87: +K13-K50
L87: +L13-L50
M87: +M13-M50
N87: +N13-N50
O87: +O13-O50
P87: +P13-P50
A88: 'Fixtures
B88: +B14-B51
C88: +C14-C51
D88: +D14-D51
E88: +E14-E51
F88: +F14-F51
G88: +G14-G51
H88: +H14-H51
I88: +I14-I51
J88: +J14-J51
K88: +K14-K51
L88: +L14-L51
M88: +M14-M51
N88: +N14-N51
O88: +O14-O51
P88: +P14-P51
A89: 'Programming
B89: +B15-B52
C89: +C15-C52
D89: +D15-D52
E89: +E15-E52
F89: +F15-F52
G89: +G15-G52
```

```
H89: +H15-H52
I89: +I15-I52
J89: +J15-J52
K89: +K15-K52
L89: +L15-L52
M89: +M15-M52
N89: +N15-N52
O89: +O15-O52
P89: +P15-P52
A90: 'Supplied & Material
B90: +B16-B53
C90: +C16-C53
D90: +D16-D53
E90: +E16-E53
F90: +F16-F53
G90: +G16-G53
H90: +H16-H53
I90: +I16-I53
J90: +J16-J53
K90: +K16-K53
L90: +L16-L53
M90: +M16-M53
N90: +N16-N53
O90: +O16-O53
P90: +P16-P53
A91: 'Equipment Maintenance
B91: +B17-B54
C91: +C17-C54
D91: +D17-D54
E91: +E17-E54
F91: +F17-F54
G91: +G17-G54
H91: +H17-H54
I91: +I17-I54
J91: +J17-J54
K91: +K17-K54
L91: +L17-L54
M91: +M17-M54
N91: +N17-N54
O91: +O17-O54
P91: +P17-P54
A92: 'Equipment Repair
B92: +B18-B55
C92: +C18-C55
D92: +D18-D55
E92: +E18-E55
F92: +F18-F55
G92: +G18-G55
H92: +H18-H55
I92: +I18-I55
```

```
J92: +J18-J55
K92: +K18-K55
L92: +L18-L55
M92: +M18-M55
N92: +N18-N55
O92: +O18-O55
P92: +P18-P55
A93: 'Equipment Overhaul
B93: +B19-B56
C93: +C19-C56
D93: +D19-D56
E93: +E19-E56
F93: +F19-F56
G93: +G19-G56
H93: +H19-H56
I93: +I19-I56
J93: +J19-J56
K93: +K19-K56
L93: +L19-L56
M93: +M19-M56
N93: +N19-N56
O93: +O19-O56
P93: +P19-P56
A94: 'Facilities Modifications
B94: +B20-B57
C94: +C20-C57
D94: +D20-D57
E94: +E20-E57
F94: +F20-F57
G94: +G20-G57
H94: +H20-H57
I94: +I20-I57
J94: +J20-J57
K94: +K20-K57
L94: +L20-L57
M94: +M20-M57
N94: +N20-N57
O94: +O20-O57
P94: +P20-P57
A95: 'Manufacturing Labor
B95: +B21-B58
C95: +C21-C58
D95: +D21-D58
E95: +E21-E58
F95: +F21-F58
G95: +G21-G58
H95: +H21-H58
I95: +I21-I58
J95: +J21-J58
K95: +K21-K58
```

```
L95: +L21-L58
M95: +M21-M58
N95: +N21-N58
O95: +O21-O58
P95: +P21-P58
A96: 'Engineering Labor
B96: +B22-B59
C96: +C22-C59
D96: +D22-D59
E96: +E22-E59
F96: +F22-F59
G96: +G22-G59
H96: +H22-H59
I96: +I22-I59
J96: +J22-J59
K96: +K22-K59
L96: +L22-L59
M96: +M22-M59
N96: +N22-N59
O96: +O22-O59
P96: +P22-P59
A97: 'Production Control
B97: +B23-B60
C97: +C23-C60
D97: +D23-D60
E97: +E23-E60
F97: +F23-F60
G97: +G23-G60
H97: +H23-H60
I97: +I23-I60
J97: +J23-J60
K97: +K23-K60
L97: +L23-L60
M97: +M23-M60
N97: +N23-N60
O97: +O23-O60
P97: +P23-P60
A98: 'Shop Supervision
B98: +B24-B61
C98: +C24-C61
D98: +D24-D61
E98: +E24-E61
F98: +F24-F61
G98: +G24-G61
H98: +H24-H61
I98: +I24-I61
J98: +J24-J61
K98: +K24-K61
L98: +L24-L61
M98: +M24-M61
```

```
A101: 'Training
B101: +B27-B64
C101: +C27-C64
D101: +D27-D64
E101: +E27-E64
F101: +F27-F64
G101: +G27-G64
H101: +H27-H64
I101: +I27-I64
J101: +J27-J64
K101: +K27-K64
L101: +L27-L64
M101: +M27-M64
N101: +N27-N64
O101: +O27-O64
P101: +P27-P64
A102: 'Inventory Costs
B102: +B28-B65
C102: +C28-C65
D102: +D28-D65
E102: +E28-E65
F102: +F28-F65
G102: +G28-G65
H102: +H28-H65
I102: +I28-I65
J102: +J28-J65
K102: +K28-K65
L102: +L28-L65
M102: +M28-M65
N102: +N28-N65
O102: +O28-O65
P102: +P28-P65
A103: 'Scrap & Rework
B103: +B29-B66
C103: +C29-C66
D103: +D29-D66
E103: +E29-E66
F103: +F29-F66
G103: +G29-G66
H103: +H29-H66
I103: +I29-I66
J103: +J29-J66
K103: +K29-K66
L103: +L29-L66
M103: +M29-M66
N103: +N29-N66
O103: +O29-O66
P103: +P29-P66
A104: 'Floor Space Costs
B104: +B30-B67
C104: +C30-C67
D104: +D30-D67
E104: +E30-E67
F104: +F30-F67
G104: +G30-G67
H104: +H30-H67
I104: +I30-I67
```

```
J104: +J30-J67
K104: +K30-K67
L104: +L30-L67
M104: +M30-M67
N104: +N30-N67
O104: +O30-O67
P104: +P30-P67
A105: 'Other MFG. Overhead Costs
B105: +B31-B68
C105: +C31-C68
D105: +D31-D68
E105: +E31-E68
F105: +F31-F68
G105: +G31-G68
H105: +H31-H68
I105: +I31-I68
J105: +J31-J68
K105: +K31-K68
L105: +L31-L68
M105: +M31-M68
N105: +N31-N68
O105: +O31-O68
P105: +P31-P68
A106: 'Engineering Overhead
B106: +B32-B69
C106: +C32-C69
D106: +D32-D69
E106: +E32-E69
F106: +F32-F69
G106: +G32-G69
H106: +H32-H69
I106: +I32-I69
J106: +J32-J69
K106: +K32-K69
L106: +L32-L69
M106: +M32-M69
N106: +N32-N69
O106: +O32-O69
P106: +P32-P69
A107: 'Administrative Costs
B107: +B33-B70
C107: +C33-C70
D107: +D33-D70
E107: +E33-E70
F107: +F33-F70
G107: +G33-G70
H107: +H33-H70
I107: +I33-I70
J107: +J33-J70
K107: +K33-K70
```

```
L107: +L33-L70
M107: +M33-M70
N107: +N33-N70
O107: +O33-O70
P107: +P33-P70
A108: 'Property Taxes
B108: +B34-B71
C108: +C34-C71
D108: +D34-D71
E108: +E34-E71
F108: +F34-F71
G108: +G34-G71
H108: +H34-H71
I108: +I34-I71
J108: +J34-J71
K108: +K34-K71
L108: +L34-L71
M108: +M34-M71
N108: +N34-N71
O108: +O34-O71
P108: +P34-P71
A109: 'Utilities
B109: +B35-B72
C109: +C35-C72
D109: +D35-D72
E109: +E35-E72
F109: +F35-F72
G109: +G35-G72
H109: +H35-H72
I109: +I35-I72
J109: +J35-J72
K109: +K35-K72
L109: +L35-L72
M109: +M35-M72
N109: +N35-N72
O109: +O35-O72
P109: +P35-P72
A110: 'Interest (Cost of borrowed $)
B110: +B36-B73
C110: +C36-C73
D110: +D36-D73
E110: +E36-E73
F110: +F36-F73
G110: +G36-G73
H110: +H36-H73
I110: +I36-I73
J110: +J36-J73
K110: +K36-K73
L110: +L36-L73
M110: +M36-M73
```

```
N110: +N36-N73
O110: +O36-O73
P110: +P36-P73
A111: 'Other Expenses
B111: +B37-B74
C111: +C37-C74
D111: +D37-D74
E111: +E37-E74
F111: +F37-F74
G111: +G37-G74
H111: +H37-H74
I111: +I37-I74
J111: +J37-J74
K111: +K37-K74
L111: +L37-L74
M111: +M37-M74
N111: +N37-N74
O111: +O37-O74
P111: +P37-P74
A113: 'Equipment Salvage Value
B113: +B76-B39
C113: +C76-C39
D113: +D76-D39
E113: +E76-E39
F113: +F76-F39
G113: +G76-G39
H113: +H76-H39
I113: +I76-I39
J113: +J76-J39
K113: +K76-K39
L113: +L76-L39
M113: +M76-M39
N113: +N76-N39
O113: +O76-O39
P113: +P76-P39
A115: 'NOMINAL CASH FLOW (NCF)
B115: (C2) +B41-B78
C115: (C2) +C41-C78
D115: (C2) +D41-D78
E115: (C2) +E41-E78
F115: (C2) +F41-F78
G115: (C2) +G41-G78
H115: (C2) +H41-H78
I115: (C2) +I41-I78
J115: (C2) +J41-J78
K115: (C2) +K41-K78
L115: (C2) +L41-L78
M115: (C2) +M41-M78
N115: (C2) +N41-N78
O115: (C2) +O41-O78
```

```
P115: (C2) +P41-P78
A117: \-
B117: \-
C117: \-
D117: \-
E117: \-
F117: \-
G117: \-
H117: \-
I117: \-
J117: \-
K117: \-
L117: \-
M117: \-
N117: \-
O117: \-
P117: \-
A118: 'PRODUCTION QUANTITY ADJUSTMENT
A119: '(BEFORE TAX)
A122: 'PRODUCTION QUANTITY, OLD
B122: "OLD METHOD
C122: "OLD METHOD
D122: "OLD METHOD
E122: "OLD METHOD
F122: "OLD METHOD
G122: "OLD METHOD
H122: "OLD METHOD
I122: "OLD METHOD
J122: "OLD METHOD
K122: "OLD METHOD
L122: "OLD METHOD
M122: "OLD METHOD
N122: "OLD METHOD
O122: "OLD METHOD
P122: "OLD METHOD
A123: 'METHOD
B123: "YEAR 1
C123: "YEAR 2
D123: "YEAR 3
E123: "YEAR 4
F123: "YEAR 5
G123: "YEAR 6
H123: "YEAR 7
I123: "YEAR 8
J123: "YEAR 9
K123: "YEAR 10
L123: "YEAR 11
M123: "YEAR 12
N123: "YEAR 13
O123: "YEAR 14
```

```
P123: "YEAR 15
A125: 'GROSS ANNUAL THROUGHPUT (GAT)
A127: '       ITEM A
A128: '       ITEM B
A129: '       ITEM C
A131: 'AVERAGE COST PER UNIT(CPU)
B131: (C2) +B41/+B125
C131: (C2) +C41/+C125
D131: (C2) +D41/+D125
E131: (C2) +E41/+E125
F131: (C2) +F41/+F125
G131: (C2) +G41/+G125
H131: (C2) +H41/+H125
I131: (C2) +I41/+I125
J131: (C2) +J41/+J125
K131: (C2) +K41/+K125
L131: (C2) +L41/+L125
M131: (C2) +M41/+M125
N131: (C2) +N41/+N125
O131: (C2) +O41/+O125
P131: (C2) +P41/+P125
A133: \ -
B133: \ -
C133: \ -
D133: \ -
E133: \ -
F133: \ -
G133: \ -
H133: \ -
I133: \ -
J133: \ -
K133: \ -
L133: \ -
M133: \ -
N133: \ -
O133: \ -
P133: \ -
A135: 'PRODUCTION QUANTITY, NEW
B135: "NEW METHOD
C135: "NEW METHOD
D135: "NEW METHOD
E135: "NEW METHOD
F135: "NEW METHOD
G135: "NEW METHOD
H135: "NEW METHOD
I135: "NEW METHOD
J135: "NEW METHOD
K135: "NEW METHOD
L135: "NEW METHOD
M135: "NEW METHOD
```

```
N135: "NEW METHOD
O135: "NEW METHOD
P135: "NEW METHOD
A136: 'METHOD
B136: "YEAR 1
C136: "YEAR 2
D136: "YEAR 3
E136: "YEAR 4
F136: "YEAR 5
G136: "YEAR 6
H136: "YEAR 7
I136: "YEAR 8
J136: "YEAR 9
K136: "YEAR 10
L136: "YEAR 11
M136: "YEAR 12
N136: "YEAR 13
O136: "YEAR 14
P136: "YEAR 15
A138: 'GROSS ANNUAL THROUGHPUT (GAT)
A140: '       ITEM A
A141: '       ITEM B
A142: '       ITEM C
A144: 'AVERAGE COST PER UNIT(CPU)
B144: (C2) +B78/+B138
C144: (C2) +C78/+C138
D144: (C2) +D78/+D138
E144: (C2) +E78/+E138
F144: (C2) +F78/+F138
G144: (C2) +G78/+G138
H144: (C2) +H78/+H138
I144: (C2) +I78/+I138
J144: (C2) +J78/+J138
K144: (C2) +K78/+K138
L144: (C2) +L78/+L138
M144: (C2) +M78/+M138
N144: (C2) +N78/+N138
O144: (C2) +O78/+O138
P144: (C2) +P78/+P138
A146: \-
B146: \-
C146: \-
D146: \-
E146: \-
F146: \-
G146: \-
H146: \-
I146: \-
J146: \-
K146: \-
```

```
L146: \-
M146: \-
N146: \-
O146: \-
P146: \-
A147: 'PRODUCTION QUANTITY ADJUSTMENT RESULTS
A148: 'NEW METHOD AS COMPARED TO OLD METHOD
B151: "YEAR 1
C151: "YEAR 2
D151: "YEAR 3
E151: "YEAR 4
F151: "YEAR 5
G151: "YEAR 6
H151: "YEAR 7
I151: "YEAR 8
J151: "YEAR 9
K151: "YEAR 10
L151: "YEAR 11
M151: "YEAR 12
N151: "YEAR 13
O151: "YEAR 14
P151: "YEAR 15
A153: 'CHANGE IN GROSS THROUGHPUT
B153: +B138-B125
C153: +C138-C125
D153: +D138-D125
E153: +E138-E125
F153: +F138-F125
G153: +G138-G125
H153: +H138-H125
I153: +I138-I125
J153: +J138-J125
K153: +K138-K125
L153: +L138-L125
M153: +M138-M125
N153: +N138-N125
O153: +O138-O125
P153: +P138-P125
A155: '% CHANGE IN GROSS THROUGHPUT
B155: (P1) +B153/B125
C155: (P1) +C153/C125
D155: (P1) +D153/D125
E155: (P1) +E153/E125
F155: (P1) +F153/F125
G155: (P1) +G153/G125
H155: (P1) +H153/H125
I155: (P1) +I153/I125
J155: (P1) +J153/J125
K155: (P1) +K153/K125
L155: (P1) +L153/L125
```

```
M155: (P1) +M153/M125
N155: (P1) +N153/N125
O155: (P1) +O153/O125
P155: (P1) +P153/P125
A157: 'CHANGE IN PRODUCTION COST/UNIT
B157: (C2) +B144-B131
C157: (C2) +C144-C131
D157: (C2) +D144-D131
E157: (C2) +E144-E131
F157: (C2) +F144-F131
G157: (C2) +G144-G131
H157: (C2) +H144-H131
I157: (C2) +I144-I131
J157: (C2) +J144-J131
K157: (C2) +K144-K131
L157: (C2) +L144-L131
M157: (C2) +M144-M131
N157: (C2) +N144-N131
O157: (C2) +O144-O131
P157: (C2) +P144-P131
A159: '% CHANGE IN PROD COST/UNIT
B159: (P1) (+B157/B131)
C159: (P1) (+C157/C131)
D159: (P1) (+D157/D131)
E159: (P1) (+E157/E131)
F159: (P1) (+F157/F131)
G159: (P1) (+G157/G131)
H159: (P1) (+H157/H131)
I159: (P1) (+I157/I131)
J159: (P1) (+J157/J131)
K159: (P1) (+K157/K131)
L159: (P1) (+L157/L131)
M159: (P1) (+M157/M131)
N159: (P1) (+N157/N131)
O159: (P1) (+O157/O131)
P159: (P1) (+P157/P131)
A161: 'CASH FLOW AFTER ADJUSTMENT
B161: (C2) -1*(+B138*B157)
C161: (C2) -1*(+C138*C157)
D161: (C2) -1*(+D138*D157)
E161: (C2) -1*(+E138*E157)
F161: (C2) -1*(+F138*F157)
G161: (C2) -1*(+G138*G157)
H161: (C2) -1*(+H138*H157)
I161: (C2) -1*(+I138*I157)
J161: (C2) -1*(+J138*J157)
K161: (C2) -1*(+K138*K157)
L161: (C2) -1*(+L138*L157)
M161: (C2) -1*(+M138*M157)
N161: (C2) -1*(+N138*N157)
```

```
O161:  (C2) -1*(+O138*O157)
P161:  (C2) -1*(+P138*P157)
A162:  'FROM CHANGE IN PROD QUANTITY
A164:  \-
B164:  \-
C164:  \-
D164:  \-
E164:  \-
F164:  \-
G164:  \-
H164:  \-
I164:  \-
J164:  \-
K164:  \-
L164:  \-
M164:  \-
N164:  \-
O164:  \-
P164:  \-
A165:  'ADJUSTMENT FOR CHANGES IN
A166:  'QUALITY OR VALUE ADDED
B168:  "YEAR 1
C168:  "YEAR 2
D168:  "YEAR 3
E168:  "YEAR 4
F168:  "YEAR 5
G168:  "YEAR 6
H168:  "YEAR 7
I168:  "YEAR 8
J168:  "YEAR 9
K168:  "YEAR 10
L168:  "YEAR 11
M168:  "YEAR 12
N168:  "YEAR 13
O168:  "YEAR 14
P168:  "YEAR 15
A170:  'CHANGE IN VALUE ADDED PER
A171:  'UNIT AT THE WORK STATION
A172:  'UNDER NEW METHOD
A174:  'CASH FLOW IMPACT OF VAL ADDED
B174:  (C2) +B170*B138
C174:  (C2) +C170*C138
D174:  (C2) +D170*D138
E174:  (C2) +E170*E138
F174:  (C2) +F170*F138
G174:  (C2) +G170*G138
H174:  (C2) +H170*H138
I174:  (C2) +I170*I138
J174:  (C2) +J170*J138
K174:  (C2) +K170*K138
```

```
L174: (C2) +L170*L138
M174: (C2) +M170*M138
N174: (C2) +N170*N138
O174: (C2) +O170*O138
P174: (C2) +P170*P138
A176: 'CASH FLOW, VAL ADDED ADJUSTED
B176: (C1) +B174+B161
C176: (C1) +C174+C161
D176: (C1) +D174+D161
E176: (C1) +E174+E161
F176: (C1) +F174+F161
G176: (C1) +G174+G161
H176: (C1) +H174+H161
I176: (C1) +I174+I161
J176: (C1) +J174+J161
K176: (C1) +K174+K161
L176: (C1) +L174+L161
M176: (C1) +M174+M161
N176: (C1) +N174+N161
O176: (C1) +O174+O161
P176: (C1) +P174+P161
A178: 'CUM CASH FLOW, VAL ADD ADJSTED
B178: (C1) +B176
C178: (C1) @SUM(B178,C176)
D178: (C1) @SUM(C178,D176)
E178: (C1) @SUM(D178,E176)
F178: (C1) @SUM(E178,F176)
G178: (C1) @SUM(F178,G176)
H178: (C1) @SUM(G178,H176)
I178: (C1) @SUM(H178,I176)
J178: (C1) @SUM(I178,J176)
K178: (C1) @SUM(J178,K176)
L178: (C1) @SUM(K178,L176)
M178: (C1) @SUM(L178,M176)
N178: (C1) @SUM(M178,N176)
O178: (C1) @SUM(N178,O176)
P178: (C1) @SUM(O178,P176)
A179: \-
B179: \-
C179: \-
D179: \-
E179: \-
F179: \-
G179: \-
H179: \-
I179: \-
J179: \-
K179: \-
L179: \-
M179: \-
```

```
N179: \-
O179: \-
P179: \-
A181: 'INTERNAL RATE OF RETURN
B181: (F2) @IRR(0.4,B176..P176)
A183: 'DISCOUNT RATE =
B183: (F2) 0.2
A185: 'NPV OF INVESTMENT
B185: (C2) @NPV(B183,B176..P176)
A187: \-
B187: \-
C187: \-
D187: \-
E187: \-
F187: \-
G187: \-
H187: \-
I187: \-
J187: \-
K187: \-
L187: \-
M187: \-
N187: \-
O187: \-
P187: \-
B189: "YEAR 1
C189: "YEAR 2
D189: "YEAR 3
E189: "YEAR 4
F189: "YEAR 5
G189: "YEAR 6
H189: "YEAR 7
I189: "YEAR 8
J189: "YEAR 9
K189: "YEAR 10
L189: "YEAR 11
M189: "YEAR 12
N189: "YEAR 13
O189: "YEAR 14
P189: "YEAR 15
A191: 'DISCOUNTED CASH FLOW
B191: (C2) @EXP(-B183*1)*B176
C191: (C2) @EXP(-B183*2)*C176
D191: (C2) @EXP(-B183*3)*D176
E191: (C2) @EXP(-B183*4)*E176
F191: (C2) @EXP(-B183*5)*F176
G191: (C2) @EXP(-B183*6)*G176
H191: (C2) @EXP(-B183*7)*H176
I191: (C2) @EXP(-B183*8)*I176
J191: (C2) @EXP(-B183*9)*J176
```

```
K191: (C2) @EXP(-B183*10)*K176
L191: (C2) @EXP(-B183*11)*L176
M191: (C2) @EXP(-B183*12)*M176
N191: (C2) @EXP(-B183*13)*N176
O191: (C2) @EXP(-B183*14)*O176
P191: (C2) @EXP(-B183*15)*P176
A192: '(CONTINUOUS DISCOUNTING)
A194: 'DISCOUNTED CUM. CASH FLOW
B194: (C2) +B191
C194: (C2) +B194+C191
D194: (C2) +C194+D191
E194: (C2) +D194+E191
F194: (C2) +E194+F191
G194: (C2) +F194+G191
H194: (C2) +G194+H191
I194: (C2) +H194+I191
J194: (C2) +I194+J191
K194: (C2) +J194+K191
L194: (C2) +K194+L191
M194: (C2) +L194+M191
N194: (C2) +M194+N191
O194: (C2) +N194+O191
P194: (C2) +O194+P191
A196: \-
B196: \-
C196: \-
D196: \-
E196: \-
F196: \-
G196: \-
H196: \-
I196: \-
J196: \-
K196: \-
L196: \-
M196: \-
N196: \-
O196: \-
P196: \-
A197: 'AFTER TAX ANALYSIS
A200: 'COMPUTATION OF DEPRECIATION, INVESTMENT TAX CREDITS, & TAX SAVING

A202: 'INVESTMENT IN DEPRECIABLE
B202: "OLD METHOD
C202: "OLD METHOD
D202: "OLD METHOD
E202: "OLD METHOD
F202: "OLD METHOD
G202: "OLD METHOD
H202: "OLD METHOD
I202: "OLD METHOD
```

```
I217: 0.1*I208
J217: 0.1*J208
K217: 0.1*K208
L217: 0.1*L208
M217: 0.1*M208
N217: 0.1*N208
O217: 0.1*O208
P217: 0.1*P208
A219: 'TOT FED INVESTMENT TAX CREDIT
B219: (C2) @SUM(B217..B214)
C219: (C2) @SUM(C217..C214)
D219: (C2) @SUM(D217..D214)
E219: (C2) @SUM(E217..E214)
F219: (C2) @SUM(F217..F214)
G219: (C2) @SUM(G217..G214)
H219: (C2) @SUM(H217..H214)
I219: (C2) @SUM(I217..I214)
J219: (C2) @SUM(J217..J214)
K219: (C2) @SUM(K217..K214)
L219: (C2) @SUM(L217..L214)
M219: (C2) @SUM(M217..M214)
N219: (C2) @SUM(N217..N214)
O219: (C2) @SUM(O217..O214)
P219: (C2) @SUM(P217..P214)
A221: 'DEPRECIATION 1ST YR BASIS
A223: '3 Yr Property
B223: (+B205-(B214/2))
C223: (+C205-(C214/2))
D223: (+D205-(D214/2))
E223: (+E205-(E214/2))
F223: (+F205-(F214/2))
G223: (+G205-(G214/2))
H223: (+H205-(H214/2))
I223: (+I205-(I214/2))
J223: (+J205-(J214/2))
K223: (+K205-(K214/2))
L223: (+L205-(L214/2))
M223: (+M205-(M214/2))
N223: (+N205-(N214/2))
O223: (+O205-(O214/2))
P223: (+P205-(P214/2))
A224: '5 Yr Property
B224: (+B206-(B215/2))
C224: (+C206-(C215/2))
D224: (+D206-(D215/2))
E224: (+E206-(E215/2))
F224: (+F206-(F215/2))
G224: (+G206-(G215/2))
H224: (+H206-(H215/2))
I224: (+I206-(I215/2))
```

```
J224:  (+J206-(J215/2))
K224:  (+K206-(K215/2))
L224:  (+L206-(L215/2))
M224:  (+M206-(M215/2))
N224:  (+N206-(N215/2))
O224:  (+O206-(O215/2))
P224:  (+P206-(P215/2))
A225:  '10 Yr Property
B225:  (+B207-(B216/2))
C225:  (+C207-(C216/2))
D225:  (+D207-(D216/2))
E225:  (+E207-(E216/2))
F225:  (+F207-(F216/2))
G225:  (+G207-(G216/2))
H225:  (+H207-(H216/2))
I225:  (+I207-(I216/2))
J225:  (+J207-(J216/2))
K225:  (+K207-(K216/2))
L225:  (+L207-(L216/2))
M225:  (+M207-(M216/2))
N225:  (+N207-(N216/2))
O225:  (+O207-(O216/2))
P225:  (+P207-(P216/2))
A226:  '15 Yr Property
B226:  (+B208-(B217/2))
C226:  (+C208-(C217/2))
D226:  (+D208-(D217/2))
E226:  (+E208-(E217/2))
F226:  (+F208-(F217/2))
G226:  (+G208-(G217/2))
H226:  (+H208-(H217/2))
I226:  (+I208-(I217/2))
J226:  (+J208-(J217/2))
K226:  (+K208-(K217/2))
L226:  (+L208-(L217/2))
M226:  (+M208-(M217/2))
N226:  (+N208-(N217/2))
O226:  (+O208-(O217/2))
P226:  (+P208-(P217/2))
A228:  'COMPUTE ANNUAL DEPRECIATION:
A230:  '3 Yr Property
B230:  0.25*B223
C230:  0.25*C223+(B223*0.38)
D230:  0.25*D223+(C223*0.38)+(0.37*B223)
E230:  0.25*E223+(D223*0.38)+(0.37*C223)
F230:  0.25*F223+(E223*0.38)+(0.37*D223)
G230:  0.25*G223+(F223*0.38)+(0.37*E223)
H230:  0.25*H223+(G223*0.38)+(0.37*F223)
I230:  0.25*I223+(H223*0.38)+(0.37*G223)
J230:  0.25*J223+(I223*0.38)+(0.37*H223)
```

```
K230:  0.25*K223+(J223*0.38)+(0.37*I223)
L230:  0.25*L223+(K223*0.38)+(0.37*J223)
M230:  0.25*M223+(L223*0.38)+(0.37*K223)
N230:  0.25*N223+(M223*0.38)+(0.37*L223)
O230:  0.25*O223+(N223*0.38)+(0.37*M223)
P230:  0.25*P223+(O223*0.38)+(0.37*N223)
A231:  '5 Yr Property
B231:  0.15*B224
C231:  0.15*C224+(B224*0.22)
D231:  0.15*D224+(C224*0.22)+(0.21*B224)
E231:  0.15*E224+(D224*0.22)+(0.21*C224)+(0.21*B224)
F231:  0.15*F224+(E224*0.22)+(0.21*D224)+(0.21*C224)+(0.21*B224)
G231:  0.15*G224+(F224*0.22)+(0.21*E224)+(0.21*D224)+(0.21*C224)
H231:  0.15*H224+(G224*0.22)+(0.21*F224)+(0.21*E224)+(0.21*D224)
I231:  0.15*I224+(H224*0.22)+(0.21*G224)+(0.21*F224)+(0.21*E224)
J231:  0.15*J224+(I224*0.22)+(0.21*H224)+(0.21*G224)+(0.21*F224)
K231:  0.15*K224+(J224*0.22)+(0.21*I224)+(0.21*H224)+(0.21*G224)
L231:  0.15*L224+(K224*0.22)+(0.21*J224)+(0.21*I224)+(0.21*H224)
M231:  0.15*M224+(L224*0.22)+(0.21*K224)+(0.21*J224)+(0.21*I224)
N231:  0.15*N224+(M224*0.22)+(0.21*L224)+(0.21*K224)+(0.21*J224)
O231:  0.15*O224+(N224*0.22)+(0.21*M224)+(0.21*L224)+(0.21*K224)
P231:  0.15*P224+(O224*0.22)+(0.21*N224)+(0.21*M224)+(0.21*L224)
A232:  '10 Yr Property
B232:  0.08*B225
C232:  0.08*C225+(0.14*B225)
D232:  0.08*D225+(0.14*C225)+(0.12*B225)
E232:  0.08*E225+(0.14*D225)+(0.12*C225)+(0.1*B225)
F232:  0.08*F225+(0.14*E225)+(0.12*D225)+(0.1*C225)+(0.1*B225)
G232:  0.08*G225+(0.14*F225)+(0.12*E225)+(0.1*D225)+(0.1*C225)+(0.1*B225)
H232:  0.08*H225+(0.14*G225)+(0.12*F225)+(0.1*E225)+(0.1*D225)+(0.1*C225)
+(0.09*B225)
I232:  0.08*I225+(0.14*H225)+(0.12*G225)+((D225+E225+F225)*0.1)+(0.09*(B2
25+C225))
J232:  0.08*J225+(0.14*I225)+(0.12*H225)+(0.1*(E225+F225+G225))+(0.09*(B2
25+C225+D225))
K232:  0.08*K225+(0.14*J225)+(0.12*I225)+(0.1*(F225+G225+H225))+(0.09*(B2
25+C225+D225+E225))
L232:  0.08*L225+(0.14*K225)+(0.12*J225)+(0.1*(G225+H225+I225))+(0.09*(C2
25+D225+E225+F225))
M232:  0.08*M225+(0.14*L225)+(0.12*K225)+(0.1*(H225+I225+J225))+(0.09*(D2
25+E225+F225+G225))
N232:  0.08*N225+(0.14*M225)+(0.12*L225)+(0.1*(I225+J225+K225))+(0.09*(E2
25+F225+G225+H225))
O232:  0.08*O225+(0.14*N225)+(0.12*M225)+(0.1*(J225+K225+L225))+(0.09*(F2
25+G225+H225+I225))
P232:  0.08*P225+(0.14*O225)+(0.12*N225)+(0.1*(K225+L225+M225))+(0.09*(G2
25+H225+I225+J225))
A233:  '15 Yr Property
B233:  0.12*B226
C233:  0.1*B226+(0.12*C226)
D233:  0.09*B226+(0.1*C226)+(0.12*D226)
E233:  0.08*B226+(0.09*C226)+(0.1*D226)
F233:  0.07*B226+(0.08*C226)+(0.09*D226)
G233:  0.06*B226+(0.07*C226)+(0.08*D226)
H233:  0.06*B226+(0.06*C226)+(0.07*D226)
I233:  0.06*(B226+C226+D226)
J233:  0.06*(B226+C226+D226)
K233:  (0.05*B226)+(0.06*(C226+D226))
L233:  (0.05*(B226+C226))+(0.06*D226)
```

```
 M233:  0.05*(B226+C226+D226)
N233:  0.05*(B226+C226+D226)
O233:  0.05*(B226+C226+D226)
P233:  0.05*(B226+C226+D226)
M235:  (C2) @SUM(M233..M230)
N235:  (C2) @SUM(N233..N230)
O235:  (C2) @SUM(O233..O230)
P235:  (C2) @SUM(P233..P230)
M237:  (C2) 0.46*(M235+(M155*M235))
N237:  (C2) 0.46*(N235+(N155*N235))
O237:  (C2) 0.46*(O235+(O155*O235))
P237:  (C2) 0.46*(P235+(P155*P235))
M239:  (C2) 0.46*((M41-M210)+(M155*(M41-M210)))
N239:  (C2) 0.46*((N41-N210)+(N155*(N41-N210)))
O239:  (C2) 0.46*((O41-O210)+(O155*(O41-O210)))
P239:  (C2) 0.46*((P41-P210)+(P155*(P41-P210)))
M241:  \-
N241:  \-
O241:  \-
P241:  \-
M242:  "OLD METHOD
N242:  "OLD METHOD
O242:  "OLD METHOD
P242:  "OLD METHOD
M243:  "YEAR 12
N243:  "YEAR 13
O243:  "YEAR 14
P243:  "YEAR 15
M247:  \-
N247:  \-
O247:  \-
P247:  \-
M249:  "NEW METHOD
N249:  "NEW METHOD
O249:  "NEW METHOD
P249:  "NEW METHOD
M250:  "YEAR 12
N250:  "YEAR 13
O250:  "YEAR 14
P250:  "YEAR 15
M257:  (C2) @SUM(M252..M255)
N257:  (C2) @SUM(N252..N255)
O257:  (C2) @SUM(O252..O255)
P257:  (C2) @SUM(P252..P255)
M261:  0.06*M252
```

```
N261: 0.06*N252
O261: 0.06*O252
P261: 0.06*P252
M262: 0.1*M253
N262: 0.1*N253
O262: 0.1*O253
P262: 0.1*P253
M263: 0.1*M254
N263: 0.1*N254
O263: 0.1*O254
P263: 0.1*P254
M264: 0.1*M255
N264: 0.1*N255
O264: 0.1*O255
P264: 0.1*P255
M266: (C2) @SUM(M264..M261)
N266: (C2) @SUM(N264..N261)
O266: (C2) @SUM(O264..O261)
P266: (C2) @SUM(P264..P261)
M270: (+M252-(M261/2))
N270: (+N252-(N261/2))
O270: (+O252-(O261/2))
P270: (+P252-(P261/2))
M271: (+M253-(M262/2))
N271: (+N253-(N262/2))
O271: (+O253-(O262/2))
P271: (+P253-(P262/2))
M272: (+M254-(M263/2))
N272: (+N254-(N263/2))
O272: (+O254-(O263/2))
P272: (+P254-(P263/2))
M273: (+M255-(M264/2))
N273: (+N255-(N264/2))
O273: (+O255-(O264/2))
P273: (+P255-(P264/2))
M277: 0.25*M270+(L270*0.38)+(0.37*K270)
N277: 0.25*N270+(M270*0.38)+(0.37*L270)
O277: 0.25*O270+(N270*0.38)+(0.37*M270)
P277: 0.25*P270+(O270*0.38)+(0.37*N270)
M278: 0.15*M271+(L271*0.22)+(0.21*K271)+(0.21*J271)+(0.21*I271)
N278: 0.15*N271+(M271*0.22)+(0.21*L271)+(0.21*K271)+(0.21*J271)
O278: 0.15*O271+(N271*0.22)+(0.21*M271)+(0.21*L271)+(0.21*K271)
P278: 0.15*P271+(O271*0.22)+(0.21*N271)+(0.21*M271)+(0.21*L271)
M279: 0.08*M272+(0.14*L272)+(0.12*K272)+(0.1*(H272+I272+J272))+(0.09*(D2
72+E272+F272+G272))
N279: 0.08*N272+(0.14*M272)+(0.12*L272)+(0.1*(I272+J272+K272))+(0.09*(E2
72+F272+G272+H272))
O279: 0.08*O272+(0.14*N272)+(0.12*M272)+(0.1*(J272+K272+L272))+(0.09*(F2
72+G272+H272+I272))
P279: 0.08*P272+(0.14*O272)+(0.12*N272)+(0.1*(K272+L272+M272))+(0.09*(G2
72+H272+I272+J272))
M280: 0.05*(B273+C273+D273)
N280: 0.05*(B273+C273+D273)
O280: 0.05*(B273+C273+D273)
```

```
P280: 0.05*(B273+C273+D273)
M282: (C2) @SUM(M280..M277)
N282: (C2) @SUM(N280..N277)
O282: (C2) @SUM(O280..O277)
P282: (C2) @SUM(P280..P277)
M284: (C2) 0.46*M282
N284: (C2) 0.46*N282
O284: (C2) 0.46*O282
P284: (C2) 0.46*P282
M286: (C2) 0.46*(M78-M257)
N286: (C2) 0.46*(N78-N257)
O286: (C2) 0.46*(O78-O257)
P286: (C2) 0.46*(P78-P257)
M289: \-
N289: \-
O289: \-
P289: \-
M290: "NEW METHOD
N290: "NEW METHOD
O290: "NEW METHOD
P290: "NEW METHOD
M291: "YEAR 12
N291: "YEAR 13
O291: "YEAR 14
P291: "YEAR 15
M295: \-
N295: \-
O295: \-
P295: \-
M298: "YEAR 12
N298: "YEAR 13
O298: "YEAR 14
P298: "YEAR 15
M300: (C2) +M176
N300: (C2) +N176
O300: (C2) +O176
P300: (C2) +P176
M305: (C2) +M286-M239
N305: (C2) +N286-N239
O305: (C2) +O286-O239
P305: (C2) +P286-P239
M307: (C2) (M266-M219)
N307: (C2) (N266-N219)
O307: (C2) (O266-O219)
P307: (C2) (P266-P219)
M309: (C2) (+M284-M237)
N309: (C2) (+N284-N237)
O309: (C2) (+O284-O237)
P309: (C2) (+P284-P237)
M311: (C2) +M245-M293
```

```
N311:  (C2)  +N245-N293
O311:  (C2)  +O245-O293
P311:  (C2)  +P245-P293
M313:  (C2)  +M300+M305+M307+M309+M311
N313:  (C2)  +N300+N305+N307+N309+N311
O313:  (C2)  +O300+O305+O307+O309+O311
P313:  (C2)  +P300+P305+P307+P309+P311
M315:  (C2)  +L315+M313
N315:  (C2)  +M315+N313
O315:  (C2)  +N315+O313
P315:  (C2)  +O315+P313
M326:  "YEAR 12
N326:  "YEAR 13
O326:  "YEAR 14
P326:  "YEAR 15
M328:  (C2)  @EXP(-B324*12)*M313
N328:  (C2)  @EXP(-B324*13)*N313
O328:  (C2)  @EXP(-B324*14)*O313
P328:  (C2)  @EXP(-B324*15)*P313
M331:  (C2)  +L331+M328
N331:  (C2)  +M331+N328
O331:  (C2)  +N331+O328
P331:  (C2)  +O331+P328


A322:  'FLOW, AFTER TAX, CON'T DISC
A324:  'INTERNAL RATE OF RETURN
F324:  (P2)  @IRR(0.4,B328..P328)
A325:  '(AFTER TAX), DISCOUNTED)
```

Appendix C

Test Plan

Appendix C

ROBOTICS INVESTMENT DECISION MODEL (RIDM) - PRELIMINARY DATA GATHERING PLAN (Test Plan for Phase III)

1. Phase III will test RIDM for its accuracy, adequacy, and ease of use.

a. Accuracy

(1) The accuracy of the model will be tested by running a test case which exercises all the options, and all formulas and cell references. The intermediate and final results of the model run will be checked against the analysis results as calculated by hand.

b. Adequacy

(1) We believe the model as it exists after Phase II development contains all essential analyses and outputs. However, this will be validated.

(2) A number of "like-to-have" features will be explored. Those features that are found to be especially useful, and which can be readily included, will be added to the model. Extra features to be explored include:

(a) Capability to address probabilities of future events, particularly the probability of longer term utilization of the robotic/FMS equipment.

(b) A feature to enable the quantity and value added adjustments to consider each manufactured item separately, and not just in terms of gross throughput as it presently operates.

(c) The provision of a "balance sheet impact" output, which would show the impact of the investment on the company financial statements, for each year of the analysis period.

c. Ease of use

(1) The following possible additions will be considerd to make the model easier to use:

(a) Automatic "pull down" of the depreciation schedule from the input section.

(b) Building in special studies, such as on costs (e.g. total labor cost, total equipment cost, or cost ratios) or outputs (e.g. performance, performance ratios).

(c) Providing white background to designate the inputs.

(d) Referencing all or some variables by range names instead of cell references.

(e) Using Macros to designate the analysis period, and the selection of options.

2. The users manual will be evaluated for clarity and completeness.

3.. The information for model validation will be obtained through discussions with financial staff at several of the companies surveyed during Phase I. Most contact will be by telephone, but at least one site visit will be made for hands-on field testing. The draft model will be sent to the reviewing companies as soon as approval for Phase III is obtained.